



# ANNALS OF SURGERY

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A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

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EDITED BY  
LEWIS STEPHEN PILCHER, A.M., M.D., LL.D.,  
OF NEW YORK,  
Surgeon to the Methodist Episcopal Hospital,

WITH THE COLLABORATION OF	
J. WILLIAM WHITE, Ph.D., M.D.,	WILLIAM MACEWEN, M.D.,
OF PHILADELPHIA,	OF GLASGOW,
Professor of Clinical Surgery, University of Pennsylvania; Surgeon to the University Hospital.	Professor of Surgery in the University of Glasgow.
W. H. A. JACOBSON, M.Ch.,	
OF LONDON,	
Assistant Surgeon to Guy's Hospital.	

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- PEARCE BAILEY, M.D., of New York, Assistant in Neurology, Columbia University; Consulting Neurologist to the St. Luke's and Orthopædic Hospitals.
- L. BOLTON BANGS, M.D., of New York, Professor of Genito-Urinary Surgery in the University and Bellevue Hospital Medical School; Surgeon to Bellevue Hospital.
- WILLARD BARTLETT, M.D., of St. Louis.
- CARL BECK, M.D., of New York, Visiting Surgeon to St. Mark's Hospital and to the German Poliklinik.
- ARTHUR DEAN BEVAN, M.D., of Chicago, Surgeon to the Presbyterian Hospital; Associate Professor of Surgery in Rush Medical College (University of Chicago).
- JOHN FAIRBAIRN BINNIE, C.M., of Kansas City, Mo., Professor of Surgical Pathology and Clinical Surgery in the Kansas City Medical College.
- GEORGE EMERSON BREWER, M.D., of New York, Junior Surgeon to Roosevelt Hospital; Attending Surgeon, City Hospital; Instructor in Surgery, College of Physicians and Surgeons.
- ALGERNON T. BRISTOW, M.D., of New York, Surgeon to the Long Island College, St. John's and the Kings County Hospitals.
- F. TILDEN BROWN, M.D., of New York, Adjunct Attending Surgeon to the Presbyterian Hospital; Surgeon to Trinity Hospital.
- F. S. COOLIDGE, M.D., of Chicago.
- B. FARQUHAR CURTIS, M.D., of New York, Professor of the Principles of Surgery, University and Bellevue Hospital Medical College.
- HARVEY CUSHING, M.D., of Baltimore, Associate in Surgery, The Johns Hopkins University.

GWILYM G. DAVIS, M.D., M.R.C.S. (ENG.), of Philadelphia, Surgeon to the Episcopal Hospital.

HENRY PELOUZE DE FOREST, M.D., of New York, Assistant Pathologist to the Methodist Episcopal Hospital.

B. BRINDLEY EADS, M.D., of Chicago, Professor of Applied Anatomy, Operative and Orthopædic Surgery, Illinois Medical College.

HUGO EHRENFEST, M.D., of St Louis, Mo.

CHRISTIAN FENGER, M.D., of Chicago, Professor of Clinical Surgery in the Northwestern University and in the Rush Medical School.

CHARLES H. FRAZIER, M.D., of Philadelphia.

LEONARD FREEMAN, M.D., of Denver, Colorado, Professor of Surgery, Gross Medical College; Surgeon to St. Joseph's, Arapahoe County, and Jewish National Hospitals.

RUSSELL S. FOWLER, M.D., of New York, Adjunct to the Surgeon-in-Chief to the Brooklyn Hospital; Assistant Surgeon to the Methodist Episcopal and to the German Hospitals.

CHARLES LANGDON GIBSON, M.D., of New York, Surgeon to St. Luke's and to the City Hospitals.

J. SHELTON HORSLEY, M.D., of El Paso, Texas.

NATHAN JACOBSON, M.D., of Syracuse, New York, Professor of Clinical Surgery, College of Medicine, Syracuse University; Surgeon to St. Joseph's Hospital.

J. RUDIS-JICINSKY, M.D., of Cedar Rapids, Iowa.

OTTO G. T. KILIANI, M.D., of New York, Surgeon to the German Hospital.

VAN BUREN KNOTT, M.D., of Sioux City, Iowa.

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CHARLES LESTER LEONARD, M.D., of Philadelphia.

WILLIS G. MACDONALD, M.D., of Albany, Surgeon to the Albany Hospital.

L. L. McARTHUR, M.D., of Chicago.

FRANK MARTIN, M.D., of Baltimore, Maryland, Associate Professor of Clinical Surgery, University of Maryland.

WILLY MEYER, M.D., of New York, Professor of Surgery at the New York Post-Graduate Medical School and Hospital; Surgeon to the German and to the New York Skin and Cancer Hospitals; Consulting Surgeon to the New York Infirmity.

SAMUEL J. MIXTER, M.D., of Boston, Mass., Surgeon to the Massachusetts General Hospital.

PAUL F. MORF, M.D., of Chicago, Instructor in Surgery at the Northwestern University Medical School.

FRANCIS W. MURRAY, M.D., of New York, Professor of Clinical Surgery, Cornell University Medical College; Surgeon to New York Hospital and St. Luke's Hospital.

A. J. OCHSNER, M.D., of Chicago.

M. O'HARA, JR., M.D., of Philadelphia, Gynæcologist to St. Agnes Hospital; Assistant Surgeon to Gynæcean Hospital, and Chief of Surgical Clinic at the Medico-Chirurgical Hospital.

JOHN CHADWICK OLIVER, M.D., of Cincinnati.

JOHN E. OWENS, M.D., of Chicago, Professor of Surgery in the Chicago Medical College; Surgeon to St. Luke's Hospital.

THOMAS M. PAUL, M.D., of Hazleton, Pa., Assistant Surgeon, State Hospital for Injured Persons of the Middle Coal Field of Pennsylvania.

LINDSAY PETERS, M.D., of Baltimore Maryland.

LEWIS STEPHEN PILCHER, M.D., LL.D., of New York, Surgeon to the Methodist Episcopal Hospital.

BYRON ROBINSON, M.D., of Chicago.

E. F. ROBINSON, M.D., of Kansas City, Mo., Late Acting Assistant Surgeon, United States Army.

GEORGE G. ROSS, M.D., of Philadelphia, Assistant Surgeon to the German Hospital.

SIDNEY I. SCHWAB, M.D., of St. Louis.

JOSEPH M. SPELLISSY, M.D., of Philadelphia, Surgeon to St. Joseph's and the Methodist Hospitals; Assistant Surgeon to the Orthopædic Hospital and the Orthopædic Department of the University Hospital; Surgeon to the Out-Patient Department of the Pennsylvania Hospital.

D. A. K. STEELE, M.D., of Chicago.

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DUDLEY TAIT, M.D., of San Francisco, Surgeon to the French Hospital.

JAMES P. WARBASSE, M.D., of New York, Assistant Surgeon, Methodist Episcopal Hospital.

MARTIN W. WARE, M.D., of New York.

J. COLLINS WARREN, M.D., (Hon.) F.R.C.S., of Boston, Professor of Surgery in Harvard University; Surgeon to the Massachusetts General Hospital.

HENRY GOODWIN WEBSTER, M.D., of New York.

HENRY R. WHARTON, M.D., of Philadelphia, Surgeon to the Presbyterian and Children's Hospitals; Clinical Professor of Surgery in the Woman's Medical College.

# AUTHORS OF WHOSE CONTRIBUTIONS TO RECENT SURGICAL LITERATURE ABSTRACTS ARE PUBLISHED.

	PAGE
ANSHÜTZ, WILLY, DR., Breslau.....	352
CECCHERELLI, PROFESSOR, Parma.....	503
EHRICH, E., DR., Rostock.....	807
FRIEDRICH, PAUL L., PROFESSOR, Leipzig.....	664
GRZES, DR., Innsbruck.....	806
HOFMEISTER, F., DR., Tübingen.....	357
HONSELL, B. DR., Tübingen.....	88
JACOBSTAHL, H., DR., Rostock.....	94
KOENIG, PROFESSOR, Berlin.....	98
KRAMER, HUGO, DR., Heidelberg.....	354
KROENLEIN, PROFESSOR, Zurich.....	95-807
KÜMMEL, H., DR., Hamburg.....	96
KUSNETZOW, DR., Russia.....	663
LANGE, F., DR., München.....	100
LANGEMAK, O., DR., Rostock.....	809
LEGUEU, DR.....	810
LIEBLEIN, V., DR., Prag.....	353
LUND, F. B., M.D., Boston.....	216
MARWEDEL, G., DR., Heidelberg.....	809
MEISEL, PAUL, DR., Freiburg.....	221
ROTHSCHILD, OTTO, DR., Frankfurt.....	359
RUSSELL, HAMILTON R., DR., Melbourne.....	218
SCHAUZ, A., DR., Dresden.....	99
VALLAS, MAURICE, DR., Lyon.....	356
VEIEL, F., DR., Tübingen.....	91
VITRAC, JUNIUS, DR., France.....	508
VOELCKER, FRIEDRICH, DR., Heidelberg.....	89
WOLFLER, A., PROFESSOR, Prag.....	509
ZUPPINGER, H., DR., Zurich.....	93



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## VENTRAL HERNIA FOLLOWING ABDOMINAL SECTION.<sup>1</sup>

By B. BRINDLEY EADS, M.D.,

OF CHICAGO,

PROFESSOR OF APPLIED ANATOMY, OPERATIVE OR ORTHOPÆDIC SURGERY,  
ILLINOIS MEDICAL COLLEGE.

THE occurrence of ventral hernia as a sequence of abdominal section is so common that it should command our thoughtful consideration. The variety of incisions recommended for the same operation shows that surgeons are by no means agreed as to the most trustworthy method. It is not my purpose to review the whole subject of parietal incisions, but rather to urge the adoption of those methods which personal experience has demonstrated to be of the greatest utility, both immediate and remote. Medical literature teems with descriptions of complex methods of closing the abdominal wound, but little has been said regarding the best way of making it. A few years ago only the physiology of the abdominal wall was considered, but now we look to anatomy for guidance in making the incision, as our only security against physiological impairment and the subsequent development of ventral hernia.

I believe that 15 per cent. of all patients upon whom laparotomy has been performed, if examined five years or more thereafter, will be found to be suffering from post-operative hernia. I am convinced that this percentage is too low; yet

<sup>1</sup> Presented before the Mississippi Valley Medical Association, October 9, 1900.



it is sufficiently high to make the subject one of vital importance to every physician and surgeon. Some modern surgeons do not care to make this admission, which partially accounts for the lack of figures from which to prove this assertion. On the other hand, he cannot estimate with even approximate correctness the number of cases of hernia that have followed his own operations, because many patients will, under such circumstances, apply to other operators.

During the last two years I have operated on eight cases of ventral hernia following abdominal section, only two of which occurred after operations which I had performed.

We no longer dread the almost inevitable and fatal peritonitis of pre-antiseptic days; we open the abdomen, not only for disease, but with diagnostic intent; and we believe that the mere opening of the abdomen has an only infinitesimal influence on the mortality. We must admit, however, from our own experience and the accumulated experience of operators, that ventral hernia is a frequent complication which renders the lives of the patients miserable and often entirely useless, so that they merely exist in contemplation of second operations, the ultimate results of which are more or less disappointing, since relapses, as Coley has pointed out, take place in more than one-half of the cases.

ANATOMY.—On examination of the abdomen, we are at once reminded of the striking difference between it and other great visceral cavities, owing to the lack of bone in its walls. The outline of the anterior wall constitutes an oval, whose long axis is vertical, protected superiorly at the sides and back by the false ribs. Posteriorly, it is divided into two symmetrical halves by the lumbar portion of the spinal column, whose transverse processes afford strong points for the attachment of muscles which occupy the otherwise unprotected space between the ribs and the iliac crests. Superiorly, the broad expansions of the ilia, completed behind by the promontory of the sacrum, support a portion of the abdominal viscera. The remainder of the support is afforded by the parts which enter into the composition of the abdominal parietes. The abdominal

wall presents a hexagonal-shaped figure bounded above and laterally by the costal cartilages of the six lower ribs, behind by the transverse processes of the lumbar vertebræ, and below by the iliac and pubic crests, united by Poupart's ligament. This is the accessible area, the locality in which incisions are made through contractile walls always active, and maintaining such a uniform degree of pressure on the contained organs that displacements and alterations of position are of rare occurrence, excepting when they occur through some preternatural opening.

The different layers are entitled to consideration.

*The skin* is a common habitat for pyogenic organisms. This should be remembered, and the most painstaking care exercised in the disinfection of the field of operation. The growth and activity of these organisms is greatest where the hair is most abundant and the sweat-glands are most numerous, as around the umbilicus, the mons veneris, and, in very corpulent persons, the deep transverse grooves, one of which crosses and conceals the navel, while the other is located immediately above the fat of the pubes.

*The superficial fascia* consists of two layers,—the outer, in many individuals, attains a considerable thickness, especially in the lower abdomen, the situation of the classical incision for operations on the uterus and its appendages, the bladder, and the appendix vermiformis.

The rule is to provide plenty of room by making a long skin incision and carrying it through both layers of the superficial fascia, thus enabling the operator to deal with the essential elements, the muscles, aponeuroses, and nerves. A long skin incision does not influence the mortality, nor does it increase the liability to hernia.

*Muscles and Aponeuroses.*—The great strength of the abdominal parietes is due to the thickness and the arrangement of the muscular lamellæ and their aponeurotic expansions. In the anterior and lateral walls we find on each side five muscles, of which three are vertical, two in front, the rectus and pyramidalis, and one posterior, the quadratus lumborum; while

between these two vertical planes there is a quadrilateral space filled in by three muscular layers, the external oblique, internal oblique, and transversalis, whose fibres cross one another in a more or less oblique direction. This arrangement of the muscular fibres serves to keep the organs in their normal position with reference to each other, and the contraction of these fibres causes approximation of the muscular elements and movable bony boundaries, thus offering the greatest degree of opposition to the demands of intra-abdominal pressure.

The fleshy fibres of the external oblique descend with varying obliquity; the upper fibres terminating in aponeuroses opposite a curved line which extends outward from the prominence of the ninth costal cartilage to the front of the iliac crest, while the lower fibres pass almost vertically from the lower ribs to the anterior part of the crest of the ilium. The aponeurosis or tendinous expansion of this muscle attains considerable thickness towards the lower part of the abdomen, where great strength is requisite to sustain the viscera.

The fleshy fibres of the internal oblique also diverge; the upper fibres extending obliquely inward and terminating opposite the outer border of the rectus, where they become aponeurotic and ensheath the upper three-fourths of that muscle. The two layers unite in the middle line and blend with the fibres of the aponeurosis of the corresponding muscle of the opposite side.

The fleshy fibres of the transversalis end above and below, nearer the outer border of the rectus than do the central fibres of the muscle, which are more or less scattering. From a practical stand-point, they may be regarded as a portion of the internal oblique, and may also serve as a useful guide to avoid the division of the abdominal intercostal nerves.

The rectus muscle arises from the crest of the os pubis and is enclosed by the aponeurosis of the lateral abdominal muscles for its upper three-fourths. In its lower fourth the aponeurosis passes in front, while the transversalis fascia alone separates it posteriorly from the subperitoneal areolar tissue and peritoneum. As it ascends to the chest, it leaves a space of

increasing width where the component fibres of the aponeuroses blend to form the strong tendinous band called the linea alba.

The external border is convex, to compensate for the lack of muscular substance between its outer border and the mesially concave lateral muscles. This insufficiency is due to the separation of the tendinous expansion of the internal oblique to enclose the rectus, and is known as the linea semilunaris.

The transversalis fascia is a dense aponeurotic membrane, thicker below than above, to compensate for a deficiency of muscular and tendinous supports. This condensed tissue forms the posterior sheath of the rectus along its lower fourth, where strength is especially required. It is always a useful guide in opening the abdomen, as beneath it rests the extraperitoneal tissue, which is the only structure that separates it from the parietal peritoneum,—a membrane best identified by noting the separate layers that have been cut through. If this practice be adopted, adherent peritoneum need not confuse the operator.

*Nerves.*—The abdominal muscles, either whole or in part, are helpless, and therefore useless without their nerve supply. One cannot reflect on the structure of the abdominal wall without admiring the great precision with which the nerves are supplied to these muscles. They are supplied with branches running in the connective tissue which bind together the bundles of muscular fibres, and these, finally, end so that every muscle fibre is supplied with one or more nerve fibres.

The anterior continuations of the abdominal intercostal nerves take their course, from the anterior end of the intercostal spaces between the internal oblique and transversalis muscles, to the sheath of the rectus which they perforate, and, after supplying that muscle, terminate in cutaneous branches near the linea alba. These nerves end independently, and do not anastomose with the nerves of the opposite side, nor, in all probability, with the nerves of the same side.

The nerve supply of the abdominal muscles is derived from the seventh to the twelfth intercostal inclusive, together with the ilio-inguinal and iliohypogastric.

For surgical purposes, I wish to separate these nerves

into three distinct groups, according to their course and the areas of the abdominal parietes supplied by them. The seventh and eighth pursue an obliquely ascending transverse course and are distributed to the upper third of the abdominal wall. The ninth and tenth pass transversely inward to the middle third of the abdomen. The eleventh and twelfth intercostals, iliohypogastric and ilio-inguinal nerves, descend in an obliquely transverse direction to supply the lower third of the abdomen.

If the nerve be severed, that portion of the muscle distal to the seat of division is deprived of its power of contractility; its blood supply is diminished, it wastes, weakens, and, in response to the demands of intra-abdominal pressure, all the overlying structures stretch, and hernia will inevitably result. Close suturing and accurate apposition of like structures will not prevent it; the recumbent position for a longer period of time than the customary three weeks does not lessen the liability, nor is any external appliance effective.

Intact, innervated muscular fibre is the only safeguard against hernia.

In view of these facts, therefore, confirmed by clinical experience, the first rule should be to make the abdominal incision parallel, or nearly parallel, with the direction of the motor nerves and of the most important muscular fibres supplied by these nerves.

In the consideration of the incision, the following important points must be taken up:

(1) The length is largely dependent upon the thickness of the superficial fascia; it must be sufficient to allow free access to the muscles whose functional integrity is essential to success.

(2) The length must be relatively greater when muscular fibres are to be separated instead of divided.

(3) It must vary with the pathological condition for which the operation is performed.

(4) An opening of sufficient size must be secured for thorough exploration and to obtain the requisite degree of precision and rapidity in manipulation.

(5) A long incision through the skin and superficial fascia does not predispose to hernia.

(6) It lessens the mortality by providing ample space for the protection of surrounding viscera.

(7) It lessens shock by diminishing the time required for the operation, and also the duration of the anæsthesia.

Therefore the rule should be: Let the incision be long enough to provide every facility for thorough work through muscular fibres and nerves which have been separated rather than divided.

Guided by the principles above enunciated, I will now consider the incisions which I have found most useful.

Incision No. 1 begins about two fingers' breadth below the xiphoid appendix, gives ready access to the stomach, and through it most of the operations on this viscus may be done. The distance from the bony margins is sufficient to permit ample mobility to meet the requirements of a movable stomach,—a feature well marked under conditions which demand operation. Provision of operating space is one of the leading requisites, and, in order to secure this, it may be necessary to incise one or both of the recti muscles transversely. This will give the freest possible access in pylorotomy with the minimum injury to the motor nerves. The additional transverse scar, which is not unlike the *lineæ transversæ* in structure, does not interfere with the contracture of the muscle. The vertical incision over the rectus with separation of the muscular fibres, which has been recommended so highly, is a failure, but is not so disastrous in its results as is a vertical incision along the outer border of the rectus: in the former, that portion of the muscle internal to the line of separation is deprived of its motor-nerve supply; in the latter, we deliberately cut off the motor supply of that portion of the muscle which corresponds to the area of distribution of the divided nerves.

Incision No. 2 is made to the left of the rectus muscle parallel to and a little below the costal arch. It is directly opposite the stomach, and gives access to the vicinity of the cardiac orifice in the operation of gastrotomy. The incision cor-

responds with the direction of the fibres of the internal oblique, and permits separation of these fibres in their normal oblique arrangement together with their motor nerves, thus providing a muscular sphincteric action around the base of the diverticulum of the stomach or the future œsophagus, thereby prevent-

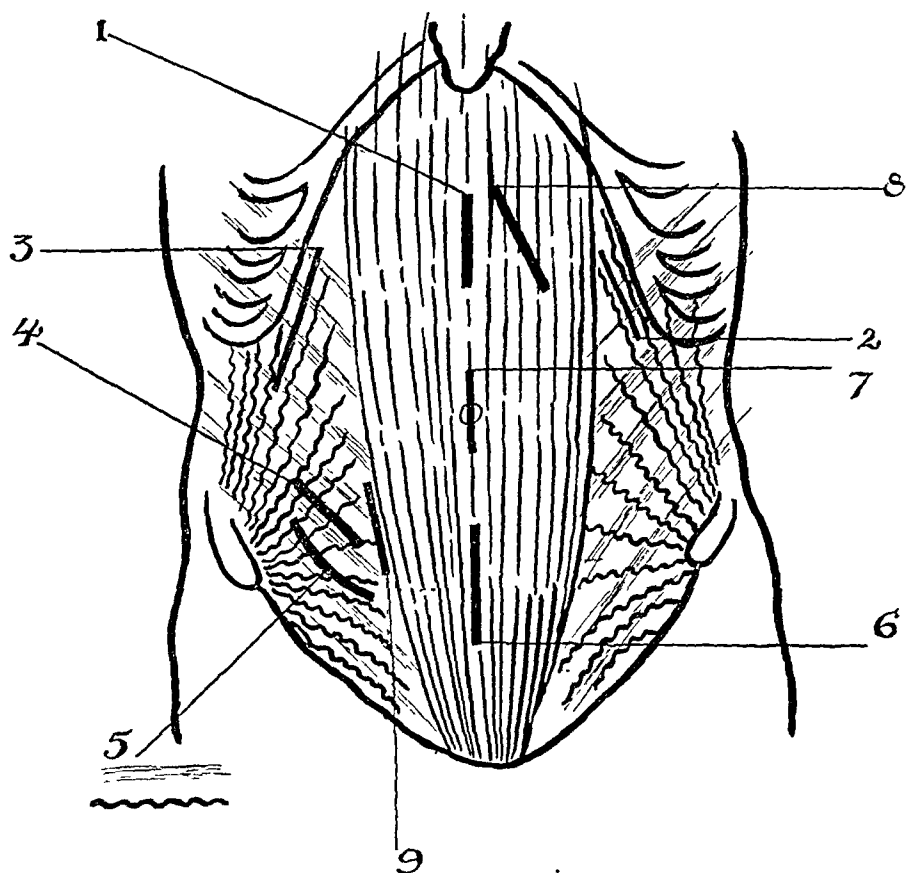


Diagram of the anterior abdominal wall to show the direction of the essential muscular fibres and the location of the principal incisions.

External oblique (straight lines). Internal oblique (zigzag lines).

1. Incision for gastrotomy, gastro-enterostomy, pylorotomy.
2. Gastrotomy.
3. Cholecystotomy and other operations on gall-bladder and gall-ducts.
4. McBurney incision.
5. Author's incision for operations on the appendix vermiformis.
6. Incision for operations on uterus and appendages.
7. Incision for exploration of the peritoneal cavity.
8. Incision obliquely downward and outward over rectus muscle with vertical separation of its fibres. The usual incision for gastrotomy.
9. Another incision for operations on the vermiform appendix and cæcum.

ing the escape of food. Howse and others recommend that the parietal incision pass vertically through the fibres of the rectus muscle in order to obtain a sphincter-like action (Incision No. 8). From what has been said before it is readily seen that such a vertical incision through the muscle must divide the terminal branches of the intercostal nerves, and that consequently the portion of the muscle distal to the divided nerves must undergo paralysis, and cannot enter into the sphincteric action desired,—a provision more desirable than the liability of ventral weakening. The much employed vertical incision in the line of the *linea semilunaris* has nothing to recommend, but much to condemn it.

Incision No. 3 is from four to six inches in length, and is three fingers' breadth below the costal margin, the centre of which corresponds to the apex of the tenth costal cartilage. This incision permits the separation of the fibres of the internal oblique together with the upper abdominal intercostal nerves, both of which can be separated after division of the external oblique, thereby giving easy access to the gall-bladder. The exigencies of operations in this region at times demand a large opening for inspection of deep underlying structures, and under these conditions it may be necessary to make a vertical incision along the *linea semilunaris*.

Incision No. 4, as recommended by McBurney, is deservedly popular owing to the care it takes in avoiding muscular fibres and their contained motor nerves, and consequently the prevention of post-operative hernia. Most surgeons agree that fewer cases of hernia follow operations in which this division is made than any other operation on the appendix. Originally, this incision was intended for non-suppurative cases in which drainage was not required, but the success which has followed the application of the principles involved in making it has caused its almost universal employment in appendicitis, including those cases with abscess formation and those in which drainage is required. The method is almost ideal in the class of cases for which it was recommended by the originator, and those who have attempted to adopt it in every case should not argue against its usefulness.



Incision No. 5. The difficulties I experienced in reaching the appendix through the McBurney incision in acute suppurative cases caused me to devise another method of approach in a more dependent part. This incision overlies the outer border of the cæcum and leads directly to the appendix. It is slightly curved outward and downward, crossing an imaginary line drawn between the anterior superior iliac spines. The centre of this curve is from an inch to an inch and a half to the inner side of the right superior iliac spine. The skin and superficial fascia are incised for about two inches. This freely exposes the aponeurosis of the external oblique, which is separated by means of the dry dissector, or the handle of a scalpel, in a direction parallel to its fibres, and well retracted. This brings into view the transversely arranged fibres of the internal oblique and transversalis muscles and the twelfth abdominal, iliohypogastric, and possibly the ilio-inguinal nerves, all of which are retracted in order to reach the transversalis fascia, which, together with the peritoneum, is divided transversely. The advantages to be gained by this incision are:

- (1) It provides easy access to the diseased area.
- (2) It enables the operator accurately and securely to protect the peritoneal cavity from infection.
- (3) It lessens the liability of breaking down the inner limiting wall of adhesions.
- (4) It affords a better opportunity to open the abscess cavity from the outer side.
- (5) It favors drainage.
- (6) It has not been followed, in the author's experience, by either appendicular fistula or post-operative hernia.

The urgent necessities of the case may require division of the muscular fibres, but the experienced operator, conscious of his ability to deal with whatever he may find within, will seek to establish, step by step, a living innervated muscular barrier against ventral hernia, the most important sequel to surgery of the appendix.

Want of space embarrasses the operator, and should not be tolerated, because at any time during the progress of the operation he can enlarge the opening along anatomical lines to

a sufficient extent to approach accurately any abscess cavity in the iliac fossa, or to make any other manipulation that may be required in the exposure and removal of the appendix.

Incision No. 9 in the linea semilunaris tends to draw the wound apart by reason of muscular action on the outer side and inaction due to paralysis of a portion of the rectus on the inner side. Incision through the fibres of the rectus is not quite so unfavorable in its results as regards hernia, yet it divides the motor nerve. It is applicable only in non-suppurative cases, as it cramps the opening, and as enlargement by incision or separation in either direction leads away from the seat of the disease.

Incision in the median line offers no advantages, and should be abandoned except in cases of ruptured abscess and diffusion of pus in the free peritoneal cavity, and then washing can be best carried out and drainage established.

Incision No. 6 divides the united aponeurosis of the rectus muscle, together with one or both of its sheaths, owing to the practical absence of linea alba below the umbilicus. This is a fortunate provision, inasmuch as hernia would take place more often were it not that the parallel muscular fibres are directly involved in the healing process, thereby adding strength to a situation where all the resistance possible must be offered against intra-abdominal pressure.

This incision is employed more often than any other, and I wish to insist on a strictly accurate median incision, avoiding the separation of muscular fibres and nerves. A shorter incision through fascia enables the surgeon to carry out both exploration and treatment to the best advantage, and yet favors him with parallel muscular fibres to facilitate approximation.

Incision No. 7 is recommended by Kelly through the umbilical ring, where the abdominal wall is thinnest, from absence of fat and muscular tissue between the skin and peritoneum. In the very corpulent it lessens the danger of suppuration during convalescence and of hernia thereafter. Should it be carried above the umbilicus, care should be taken to incline it towards the left in order to avoid the suspensory ligament of the liver.

Appropriate to the subject, and in keeping with the principles enunciated, I wish to consider briefly the treatment of ventral hernia. From the foregoing, you will observe that I regard this condition as a stretching not only of the scar tissue, but of all the tissues of the abdominal wall at the site of its occurrence. In the median line the covering of the hernia is stretched cicatrix, skin, superficial fascia, aponeurosis, and peritoneum, together with more or less separation of the recti muscles. If it occurs in the extra-median portion of the parietes, the coverings are stretched cicatrix, together with all the other tissues in the vicinity of the scar.

Ventral hernia takes place through tissues deficient in or devoid of innervation. Restoration by substituting another cicatrix through fascial tissues is useless. To remedy this breach, it is necessary to excise the redundant and atrophic tissues, bringing into the wound area as much muscular fibre as possible. It is not always necessary to enter the peritoneal cavity.

Analysis of the histological structure of the cicatrix shows that it is made up of fibrous tissue throughout its depth; therefore we should make every effort to increase the bond of union by bringing into the wound area as much tissue as possible for approximation. This can be better done by the use of a modified mass suture which in no way interferes with the accurate apposition of like structures.

In closing the abdominal wound, I first unite the peritoneum by a continuous suture of fine catgut; I then employ a well-curved, stout, Hagedorn needle armed with silkworm gut. The needle enters the skin about a quarter of an inch from the edge of the incision, passes into and through the superficial fascia, including muscular tissue and associated fibrous structures, picks up the subperitoneal areolar tissue and peritoneum near the border of the wound. The needle is again introduced on the opposite side, passing through like structures in reverse order. After all the sutures are in place and hæmostasis accomplished, the wound is raised by means of the sutures in the hands of an assistant, while the operator removes the protecting gauze and ties the sutures.

# ON TRAUMATIC KELOID OF THE MEDIAN NERVE, WITH OBSERVATIONS UPON THE AB- SORPTION OF SILK SU- TURES.<sup>1</sup>

By OTTO G. T. KILIANI, M.D.,

OF NEW YORK,

SURGEON TO THE GERMAN HOSPITAL.

THOUGH the surgery of nerves is of comparatively recent date, hardly older than thirty years, its literature proves quite extensive. From Weir Mitchell's "Sutures of Nerves," which was published in 1872, up to Schede's "Chirurgie der peripherischen Nerven," published in 1896, in Penzoldt and Stintzing's "Handbuch der Special-Therapie innerer Krankheiten," and Brun's "Die Geschwülste des Nervensystems," 1897, there is a long chain of publications.

How comparatively rare suturing of severed nerves had been up to 1881 is shown by Tillmann's report on forty-two cases, which he was able to collect from the whole literature. Gottfried Schmidt published in 1890 129 cases of suturing of nerves, 67 per cent. of which showed favorable results. R. Hahn, in his "Dissertation," Leipzig, 1897, cites 196 cases, 94 primary sutures, and 102 secondary. Since then this operation has become more frequent. Hand in hand with publications on sutured nerves go those of neurofibromata. Most of the cases published, though, are either stump-neuromata, or neuromata found on each end of the severed and ununited nerve, or spontaneous (single or multiple) neurofibromata or neurosarcomata. While I was unable to find any other data on the formation of

<sup>1</sup> Read before the New York Surgical Society, October 11, 1899.

the neurofibroma at the place of union of sutured nerves, general hints about the thickening occurring at those places are given. The growths, however, never seem to have been of sufficient size or importance to interrupt the conduction of the united nerve. If, therefore, the formation of neurofibroma of any size at the place of union of the sutured nerve seems to be unusual, a recurrence of such a benign tumor is not to be found in literature. I therefore take the liberty to present before this Society the following case:

On the 17th of October, 1898, a woman, F. K., twenty-one years old, servant, was admitted to the German Hospital with the following history:

She was referred to me by Dr. George W. Jacoby, who saw her in the German Dispensary. He also had the kindness to see the patient in several consultations with me, to observe the nerve symptoms and reactions. As far as it was possible to find out (the patient speaking practically no other language but Polish), she fell, early in August, 1898 (about ten weeks before she was admitted to the hospital), through a window and cut her left wrist. The wound was immediately attended to in one of the hospitals in this city, where she stayed from three to four weeks. Several tendons of the flexor muscles were sutured, but not the median nerve, which was severed also in the accident. Immediately after the accident, and all through this treatment, she had no power or sensation in the left hand, and therefore went finally to the St. Mark's Hospital (three or four weeks after the accident). Through the kindness of Dr. Erdmann I was able to get this information: that on August 24, 1898, the median nerve was looked up and showed the typical bulbous thickening of about the size of a cherry-stone at both ends, which were about an inch apart. The enlarged portions of the nerve were resected and the ends brought together and—no plastic operation being necessary—sutured with silk.

Patient soon left the hospital for unknown reasons and had no treatment since.

On her admission to the German Hospital she showed the following conditions: Thumb, index- and middle-finger of the left hand present a bluish, shiny appearance; the nails of these

fingers are thin and rough; on the tip of each of these fingers is a trophic ulcer. The left forearm shows on its flexor surface a scar about one and one-half inches long, just above the wrist on the median line. There is a lump, about the size of an olive, situated over and across the median nerve. This lump is hard and somewhat tender to pressure, and a tingling sensation is felt in the fingers on pressure. It is adherent to the overlying skin. There is no sensation in the index- or the middle-finger, and no power of motion in the first two fingers, which are held in the position of extension. Faradic as well as galvanic irritability of the nerve is completely missing. Slight Erb's reaction of degeneration of muscles. No voluntary flexion possible.

The history given above we did not know of at the time of the operation, as we were only able to extract it from the patient piecemeal. As we did not know that any suture of the nerve had been done, we argued, according to the clinical symptoms, that no such operation had been performed, and that the paralysis was due to interruption of continuity of the nerve.

On October 27 a large incision was made on the palmar side of the forearm from the wrist upward about six inches long. To our surprise, we found the median nerve *in continuo*, with a bulbous thickening about the size of a large olive and spindle-shaped. I resected this tumor as well as a smaller one in the cutaneous palmar branch of the median nerve, sutured the nerve, and was able to unite it without any plastic by direct paraneuric suture with the finest number of chromicized catgut; excision of the thick scar in the skin, suture, bandage in ultra flexion of the wrist. *Sensation had returned on the fourth day, October 31. On the ninth day, November 5, patient could slightly move the fingers as far as the dressing would allow.* On November 9 the dressing was removed and primary union had taken place. Patient could slightly move the fingers; sensation good; massage, faradic and galvanic treatment of nerve and muscle. On January 31, 1899, patient was discharged with the hand useful for practical purposes. The flexion of the interossei is still imperfect; no reaction of degeneration; atrophy of muscles had nearly wholly disappeared; direct faradic and galvanic excitation of the nerve normal.

Over the incision, a keloid of the entire scar of the skin has developed; a small lump underneath can be felt in the region of

the (second) suture of the nerve not adherent to the overlying scar of the skin.

Patient is seen again at the Nursery and Child's Hospital at the beginning of May; she is able to wash, scrub, and perform all household duties. (Patient was delivered of a child in April, 1899.)

On June 8, 1899, patient is again admitted to the German Hospital, as she complains of severe pain on pressure on the small tumor on the median nerve. Examination shows tumor of size of a bean freely movable under overlying scar. As the nature of this non-malignant recurrent tumor had been recognized as one similar to keloids of skin, no further operation was taken into consideration, as I expected that the tumor, if left alone, will soften and gradually grow smaller, while any operative interference seems to start the impetus to recur anew. This supposition has proved true, in so far as the tumor has become decidedly smaller, softer, and in consequence less painful.

The excised tumor has been examined microscopically. I am indebted for these specimens to the Pathologist of the German Hospital, Dr. F. Schwyzer, and his assistants.

The two ends of the nerve are found to be adapted sideways, both of them having slipped a little alongside of each other. Between the two stumps as well as around them there is a dense mass of fibrous structure. The infiltrations of numerous small cells as well as of leucocytes show plainly that no absolute primary union had occurred. Both ends or stumps show practically no degeneration of the nervous apparatus. In spite of diligent research, no new formation of nerve-cells could be found which would connect the two stumps enclosed in fibrous tissue. Serial sections show that the second resection had been made in normal tissue. No sarcomatous degeneration.

*Diagnosis.*—Neurofibroma.

This may suffice for the first part of my report.

We therefore have here the following case:

The median nerve is cut through falling into glass; of course, usual loss of power and sensation. Secondary nerve-suture with silk three or four weeks after the accident, after resection of the small bulbi on distal and central end. No

complete primary union; six weeks later a good-sized neurofibroma is found, which interrupts completely the conduction of the nerve. The tumor is again extirpated; the ends sutured with catgut; primary union achieved; immediate restoration of sensation and soon that of power; three months after this operation a small tumor has reoccurred, while the skin shows a keloid of a scar. Final result one year after the operation: Tumor has nearly disappeared under symptomatic treatment; hand and fingers of good use for practical purposes. She attends to her duties of household servant without difficulty.

While the literature on severed and sutured nerves, either primarily or secondarily, is a very extensive one, as well as on neurofibroma and re- and degeneration of nerve-fibres under these conditions, I have been unable to find a case cited where a neurofibroma without the slightest indication of sarcomatous degeneration has reoccurred after extirpation. I call attention to the fact that the incision developed twice a keloid in the skin, from which fact we must deduct the conception that the tissue of the patient has a general tendency to form fibrous hyperplasias after injury. This is the reason why I venture to call this nerve-tumor a keloid, being well aware that this designation is generally applied only to formations of the skin. True to the etymology of the word *κηλίς*, scar, there is no reason why we should not apply this term to the nerve also, the more as keloids generally have a tendency to reoccurrence, which neurofibromata lack.

Apart from the clinical and pathological interest which this case presents, there is another feature connected with it of scarcely less value. It gives us an opportunity to study the fate of silk sutures healed in after imperfect primary union,—*i.e.*, a slight inflammation. The illustrations from the microscopic sections prove to me beyond any doubt that the silk sutures used in this case, after seven weeks, are in the first stages of absorption. While I am fully aware that I am in flat contradiction with other observers, I cannot help but come to this conclusion after studying these specimens. I may add that



my colleague, Dr. F. Schwyzer, the above-mentioned pathologist, shares my opinion.

We see in many specimens in cross and longitudinal sections plainly a braid of silk the fibres of which present the well-known hyaline lustre. The cross sections are those that interest us specially. We find each cocoon fibre enclosed in a very large giant cell. It is a well-known fact that they surround any foreign body and absorb it, if their chemical action is able to do so. The cocoon fibre presents, in cross section, a spheric triangle, and absorbs hæmatoxylin enough to become completely imbued with light to dark blue. The glass-like



FIG 1—Showing cocoon fibre enclosed in the cell-body of a large giant cell with a few nuclei.

refraction around the edges makes the outlines appear somewhat grayish.

Where these fibres are still in their normal condition, enclosed in giant cells, we find a picture which I tried to depict in Fig. 1. The cocoon fibre is enclosed in the cell-body of a large giant cell with a few nuclei; the fibre is dark blue except for an edge of refraction and lighter in the centre.

In Fig. 2 the number of nuclei has decidedly increased, while the dark-blue ring of the cocoon fibre has shrunk and contracted, so to speak, towards the centre, leaving a lighter, pinkish area outside. In No. 3 we find still more nuclei, and

the whole process, as described before, further advanced. This is shown also by the appearance of detritus. In No. 4 the cocoon fibre has nearly disappeared, masses of nuclei occupy



FIG. 2.—Nuclei has decidedly increased, while the cocoon fibre has shrunk and contracted.



FIG. 3.—Showing more nuclei, and the whole process further advanced.

the cell-body, dense detritus surrounding what is left of the fibre. No. 5 represents a ball of nuclei, and shows the cell in highest activity, while in Fig. 6 the same is again at rest, the

cocoon fibre is digested, an eosine spot showing the place it previously occupied.

The shiny surface, together with the hyaline character of the cocoon fibre, renders it very difficult to decide the important

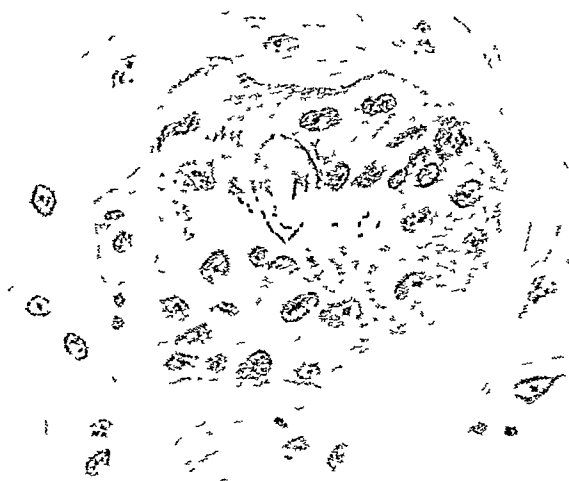


FIG. 4.—Cocoon fibre has nearly disappeared, masses of nuclei occupy the cell-body.

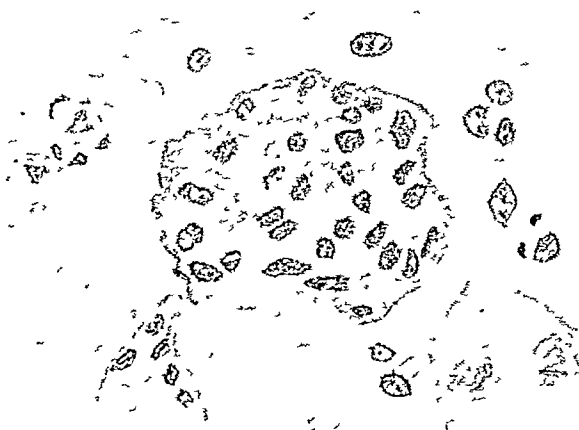


FIG. 5.—Represents a ball of nuclei, showing cell in highest activity.

question whether the outline is still intact. But the chromophile qualities of this structure lead us to the right interpretation of the chemical changes it has undergone. As long as the

cocoon fibre is intact, it invariably appears blue. In order to show pink at the edges by the absorption of eosine, the fibre must have undergone chemical changes, which are due to an action of the giant cells. This chemical action must be looked upon as an absorption, which is proved by the final disappearance of the cocoon fibre.

Many experiments have been made and much experience gathered and published on the use of silk as suturing material and its future fate. When the antiseptic era brought about primary union of the wound, the question of suture and liga-



FIG. 6—Nuclei at rest, cocoon fibre digested

ture material, which so far had always been eliminated, became acute. The idea of using absorbable material like catgut has been rightly considered a wonderful step in the progress of surgery. There was for a while quite a discussion whether foreign bodies really "heal in" without reaction and become embedded in the scar to stay there. What ultimately becomes of silk sutures used in surgical operations has been also looked into. The experiments of burying balls of silk into the abdominal cavity were of little value, as there was but little chance for the living tissue to attack such a large foreign body

for absorption. The only case of absorption of silk which I have been able to find is that of Lister, who ligated an aneurism of the external iliac in a lady fifty-one years old with silk which had been treated with carbolic acid. The wound healed after four weeks; death followed after ten months, caused by aneurism of arcus aortæ. The silk sling had completely disappeared; the knot was found in small detritus, little spikes and fibres broken into small pieces, and showing the appearance of being gnawed at the ends. No microscopical examination had been made.

In spite of rather diligent and extended research in literature, as far as it is at my disposal, I was not able to find any definite report on absorbed silk with microscopical examinations. I therefore venture to present this case, also, from this point of view. Although the silk has not disappeared macroscopically, the microscopic examination shows that absorption of single fibres of the silk has set in. It is a question whether, if more time had elapsed before extirpation of the keloid, the sutures would have been absorbed entirely. Only a prolonged and systematic series of experiments could prove definitely whether such would have been the case, or could be the case under certain conditions.

# AN INTESTINE HOLDER.

DEvised FOR FACILITATING THE END-TO-END SUTURE OF  
INTESTINE.

By EDWARD H. LEE, M.D.,  
OF CHICAGO.

THE instrument which I wish to describe is an improved device for holding the cut ends of an intestine in position while they are being sutured. The instrument can be readily adjusted to fit any intestine, and any desired tension or relaxation may be given to the parts during operation. As soon as the suture has been completed, the instrument may be made to collapse, and thus may be drawn from the intestine through a very small opening.

Before describing the features of construction and parts in detail, it might be well to review and to take into consideration the devices of this kind which have been suggested and used up to the present time.

The difficulty of intestinal suture was recognized as early as the thirteenth century, when the so-called "suture of the four masters" was introduced. This consisted of a trachea of a goose being inserted into the lumen of the bowel and the ends of severed intestines being brought into position upon it. The ends were then sutured with four interrupted stitches, which did not include the trachea. Dr. Verger, in the eighteenth century, again brought this procedure into prominence by reporting a successful case.

As soon as abdominal surgery became generally recognized, many devices, based upon the same principle, were presented to the profession. Sabatier employed oiled card-board; Guy de Chauliac made use of dry gut as a support; Watson

isinglass; Walter, gum resin; Holenhauser, dough; Clark, a bobbin of India rubber; Pilcher, a potato bobbin; Wackerhagen, digestable wafer cylinders, and Metcalf, a candy approximator.

Then came the various methods by use of decalcified bone, as suggested by Neuber, Willy Sachs, Mayo, Robinson, Bailey, Allingham, Hayes, and Ball.

Then there was the innovation of the removal of the foreign body before the suture was completed, as with the inflated rubber bulbs of Frederick Treves, Reder, Downes, Halsted, and Wackerhagen. In the last instance the rubber bulb was not removed but was perforated, allowed to collapse and pass away with the fecal current.

One of the most recent developments in this line is the employment of a mechanical contrivance with the object of holding the intestine in position while the suture is being inserted, and then its removal before the suture is completed; such as the clamps of Mudd, Grant, Morrison, Laplace, McLean, Downes, Ferguson, and O'Harra. These instruments, with the rubber bulbs, are the ones most used at the present time. It is not my purpose to give a detailed description of these various instruments or to discuss their many advantages or disadvantages. The following points may be spoken of, however, in contrasting them with the instrument presented in this paper:

(1) One instrument will fit all sizes of intestine, whereas, in the above clamps, a set of instruments of different sizes is necessary.

(2) In the above-mentioned clamps and rubber bulbs, the operator is limited to the use of certain sutures, principally the Lembert suture; whereas, with the author's holder, any method of suture may be used.

(3) There is no necessity for any preliminary retention sutures, such as are used with the bulbs and many of the forceps.

(4) No assistants are necessary to complete the suture.

(5) There is not such a tendency to diaphragm formation

during and after suture as with the methods such as the Laplace forceps and its various modifications.

The instrument in features of construction and combination of parts is fully described by the accompanying drawings. Fig. 1 is a longitudinal section of the instrument, showing it in position when in use. Fig. 2 is a view similar to Fig. 1, showing the parts in their folded or collapsed condition. Fig. 3 is a sectional view on line 3, 3, of Fig. 2.

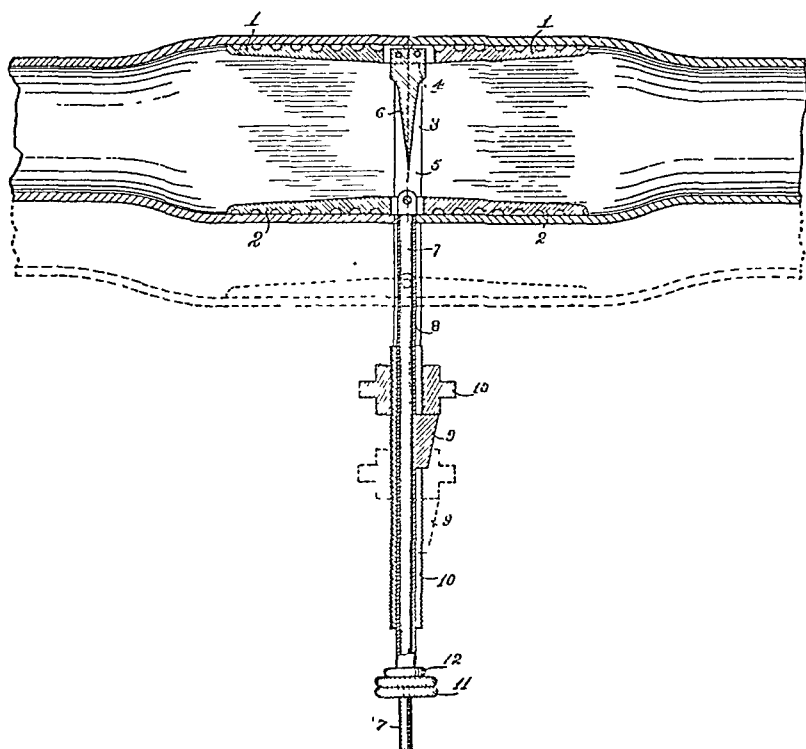


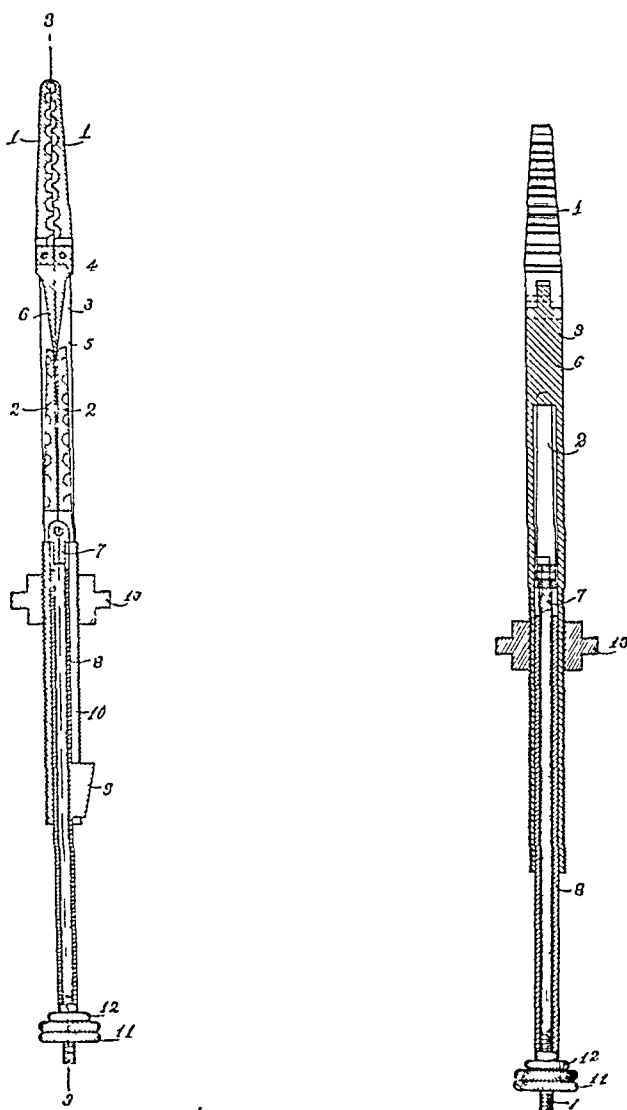
FIG. 1.—Longitudinal section of intestine holder within intestinal lumen.

The instrument consists primarily of two pairs of pivotal arms (1 and 2) forming, when extended, what might be termed a double cross, and adapted, when in this position, to have the cut ends of the intestines extended over them. The outer surfaces of the arms, which come in contact with the intestine, are serrated in order to prevent any movement of the intestine after it has been placed on the instrument in position. These arms are adapted to be separated, as illustrated in Fig. 1



in dotted lines, in order to fit any sized intestine, or to give any required tension or relaxation to the intestine during the suture.

The arms (1) are pivoted to the end of the handle or stem



FIGS. 2 and 3.—Section showing blades folded together ready for withdrawal.

(3) of the instrument with a hinge-like joint, the back of the arms being adapted to bear on the shoulder (4) on the end of the stem (3) when they are extended at right angles to this

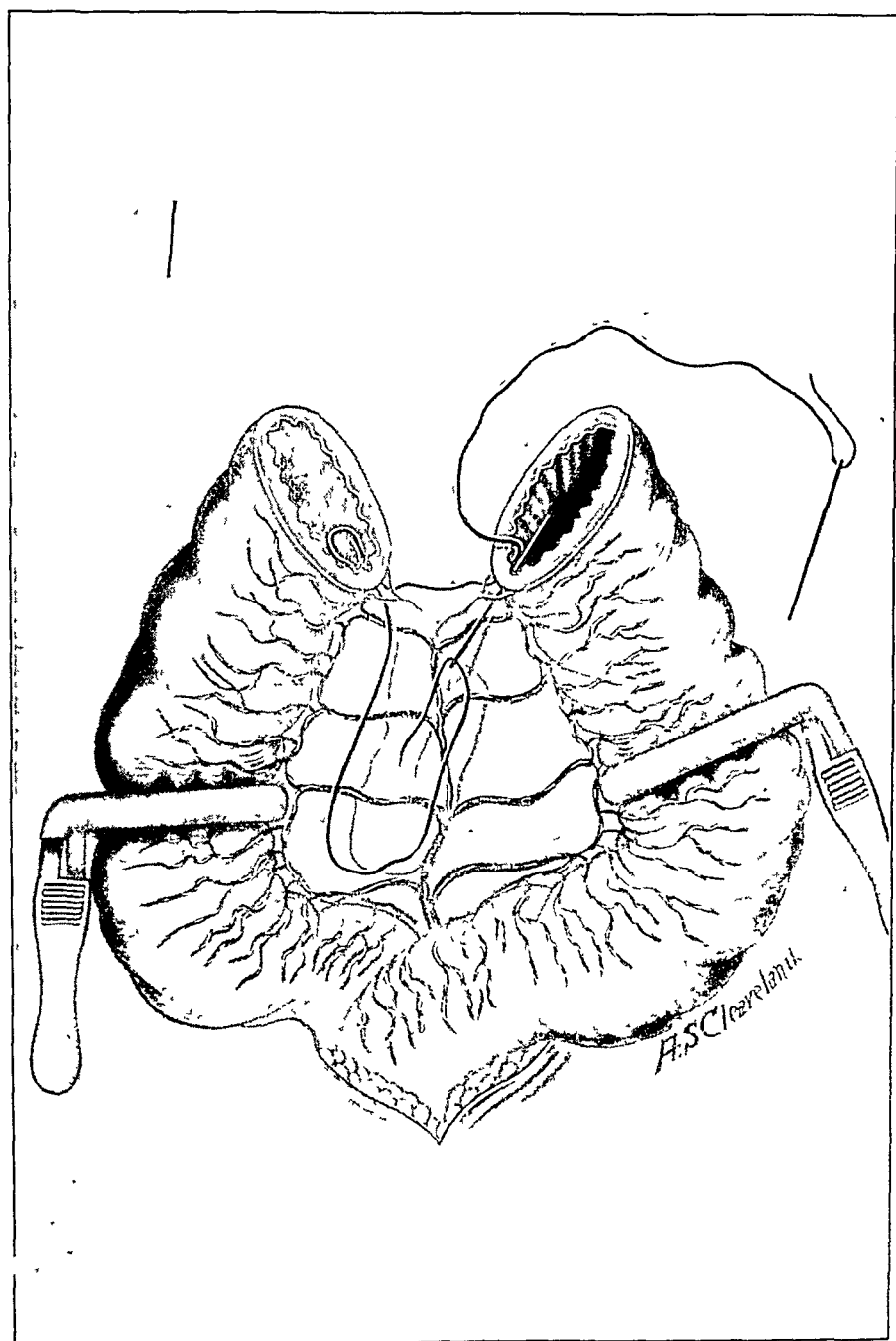


FIG. 4.—Showing method of inserting the mesenteric stitch.



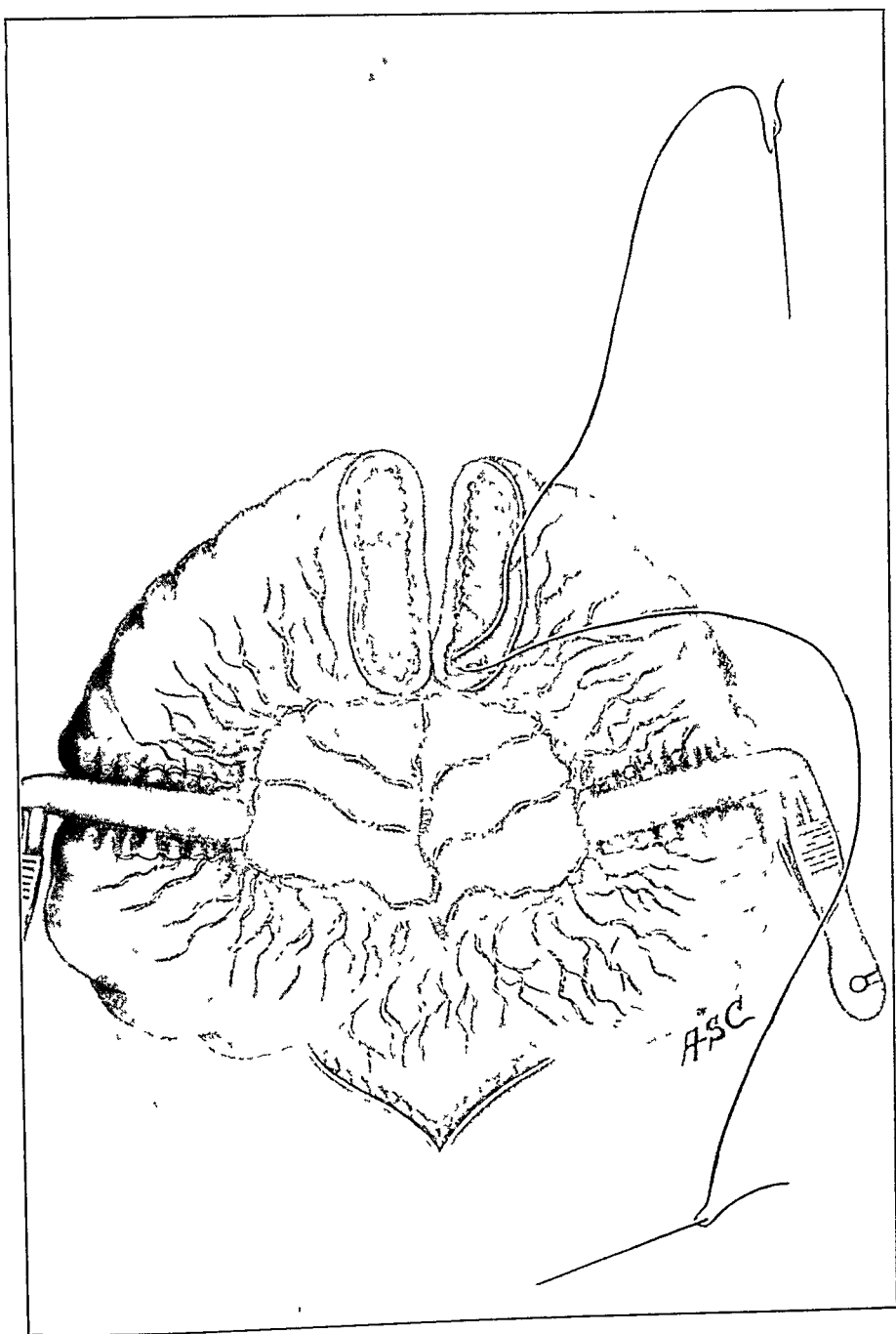


FIG. 5—Mesenteric stitch tied.



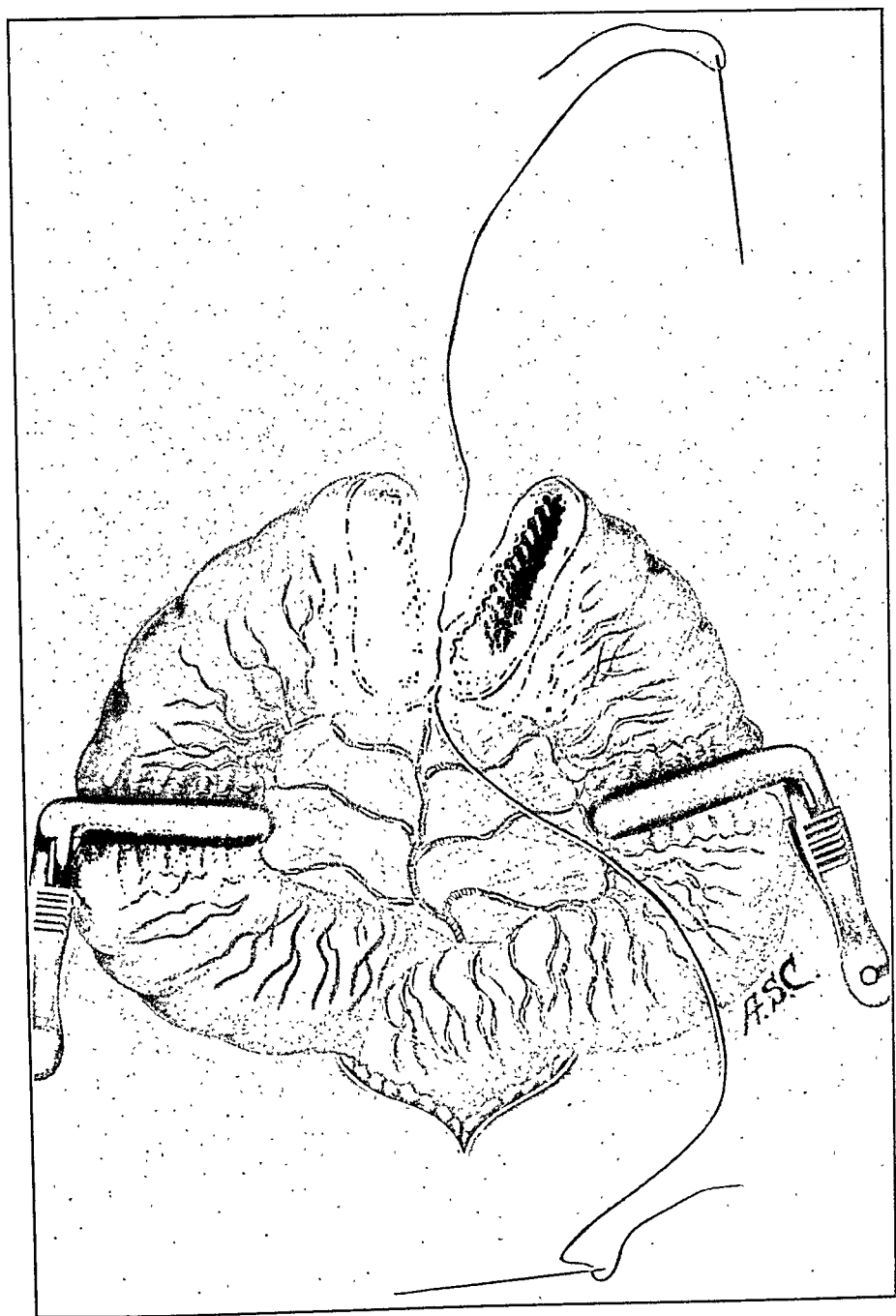


FIG. 6.—Threads have been brought from the lumen of the bowel to the outside, penetrating the bowel on either side of the knot.



stem, and thus they are prevented from being forced beyond the right angle position, and at the same time are free to be moved into the position shown in Figs. 2 and 3, where they practically form an extension of the stem (3).

Stem (3) is provided with a slot (5), within which arms (2) are adapted to lie when closed to the position shown in Figs. 2 and 3.

In making said slot (5), a central wall or wedge-like tongue (6) is left extending from the end of stem (3) to which the arms (1) are pivoted.

Arms (2) are pivotally mounted upon the end of an inner member (7) which is mounted in a tube (8), being mounted within the stem (3), and is free to move endways, but is prevented from being turned around by means of the wing or key (9), which is fastened rigidly to the wall tube (8) about midway of its length.

Key (9) is adapted to slide within a key-way or slot (10) which is formed by cutting away the wall of the stem (3) from the end of slot (5) to the outer end of said stem.

Arms (2) are held in their extended position by means of tube (8) which is adapted to be forced against the inner ends of arms (2) when they are in their extended position, by means of the nut (11) which is mounted upon the outer end of member (7), and is adapted to be screwed against the outer end of this tube. The outer end of tube (8) is provided with a slight enlargement or ring (12) to provide a suitable shoulder against which nut (11) is adapted to bear. In order to prevent nut (11) from moving too freely on member (7), the outer end of member (7) is split and the two parts are sprung outward a trifle, as shown in Fig. 2.

To provide for moving arms (2) away from arms (1), as indicated in dotted lines in Fig. 1, a nut (13) is mounted upon the outer end of stem (3), adapted to be screwed against the inner end of key (9), the various parts being in positions shown in full lines in Fig. 1, and force-tube (8), member (7) and arms (2) away from arms (1).

In using the instrument, the various parts are first brought



to the position shown in full lines in Fig. 1; the ends of the intestine to be joined together are then placed over the arms, the edges to be joined being brought together over a central line, except when they pass adjacent to the stem (3).

The arms (1) and (2) are then separated, as has been described, to give proper tension to the intestine, when the ends are secured in the usual manner.

To withdraw the instrument from the intestine, the nut (11) is backed off the tube (8), withdrawn from contact with said arms (2), which are then free to collapse towards and into the slot (5). The members (7) and tube (8) are then withdrawn through the stem (3) until arms (2) lie wholly within the stem (3), as shown in Figs. 2 and 3. Then, as stem (3) is withdrawn from the intestines, arms (1) take the position shown in Figs. 1 and 2, and are easily withdrawn.<sup>1</sup>

As before mentioned, any method of suture may be used in connection with the holder, *i.e.*, single or double, continuous or interrupted, penetrating or not penetrating the entire thickness of the bowel. Among those to be recommended are those of Lembert, Czerny-Lembert, Gussenbauer, Greig-Smith, Halsted, Cushing, Woelfler, Maunsell, and various other modifications. In describing the use of the instrument in connection with a special suture, I have chosen the Connell stitch, as I believe, when properly inserted, it is followed by ideal results. In using the Connell suture, I deviate from the original method in several ways; the principle of the suture, however, is maintained, *i.e.*, a single suture penetrating all coats of the bowel, in which all knots are placed within the lumen of the bowel. I differ in the following points:

(1) The mesenteric stitch is inserted in a different manner. (Fig. 4.)

(2) All suspending loops are dispensed with, the holder being substituted, so that only one thread is used throughout the entire procedure.

<sup>1</sup> I wish to express my thanks to V. Mueller & Co., of Chicago, who have been of great assistance to me in perfecting the mechanical details of this instrument.

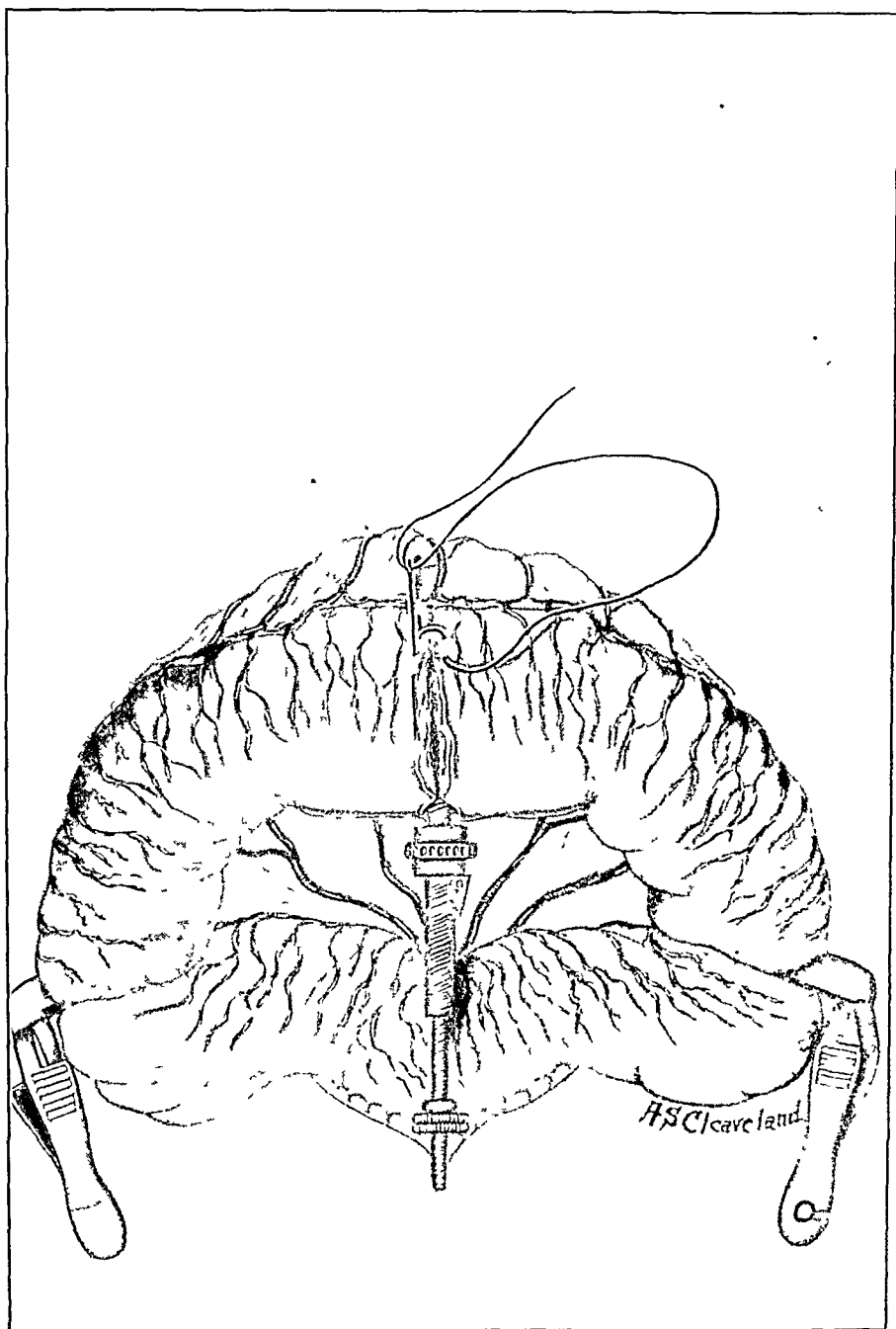


FIG. 7.—Holder inserted holding intestine in position for suture.



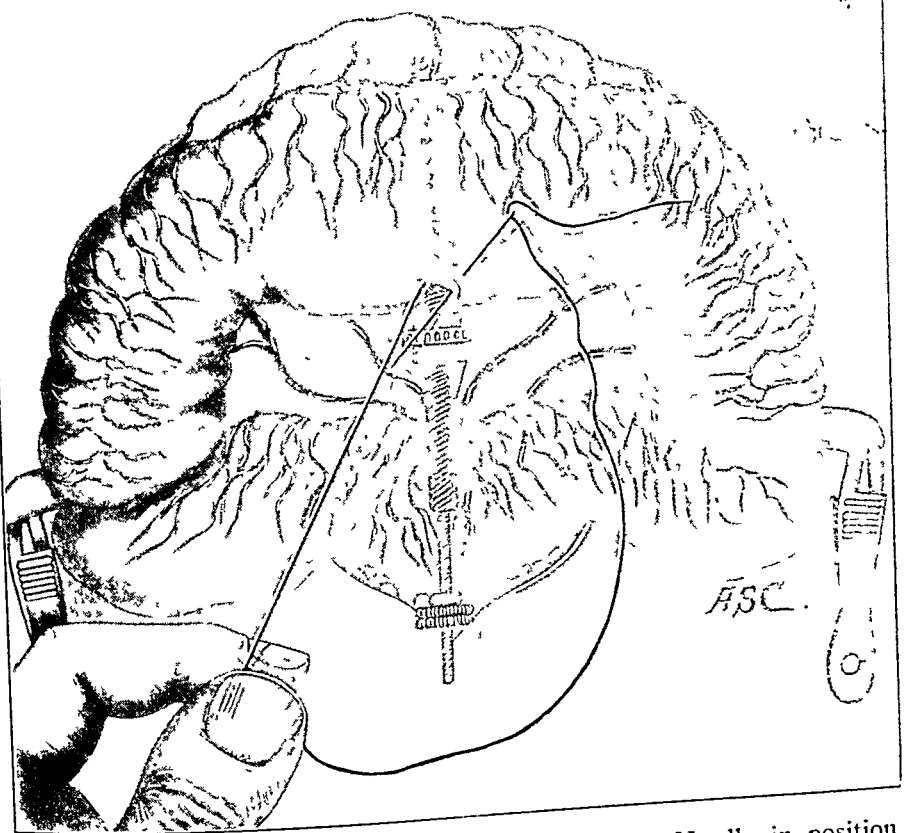


FIG. 8.—Suture of one-half of intestine completed. Needle in position for final stitch on one side.



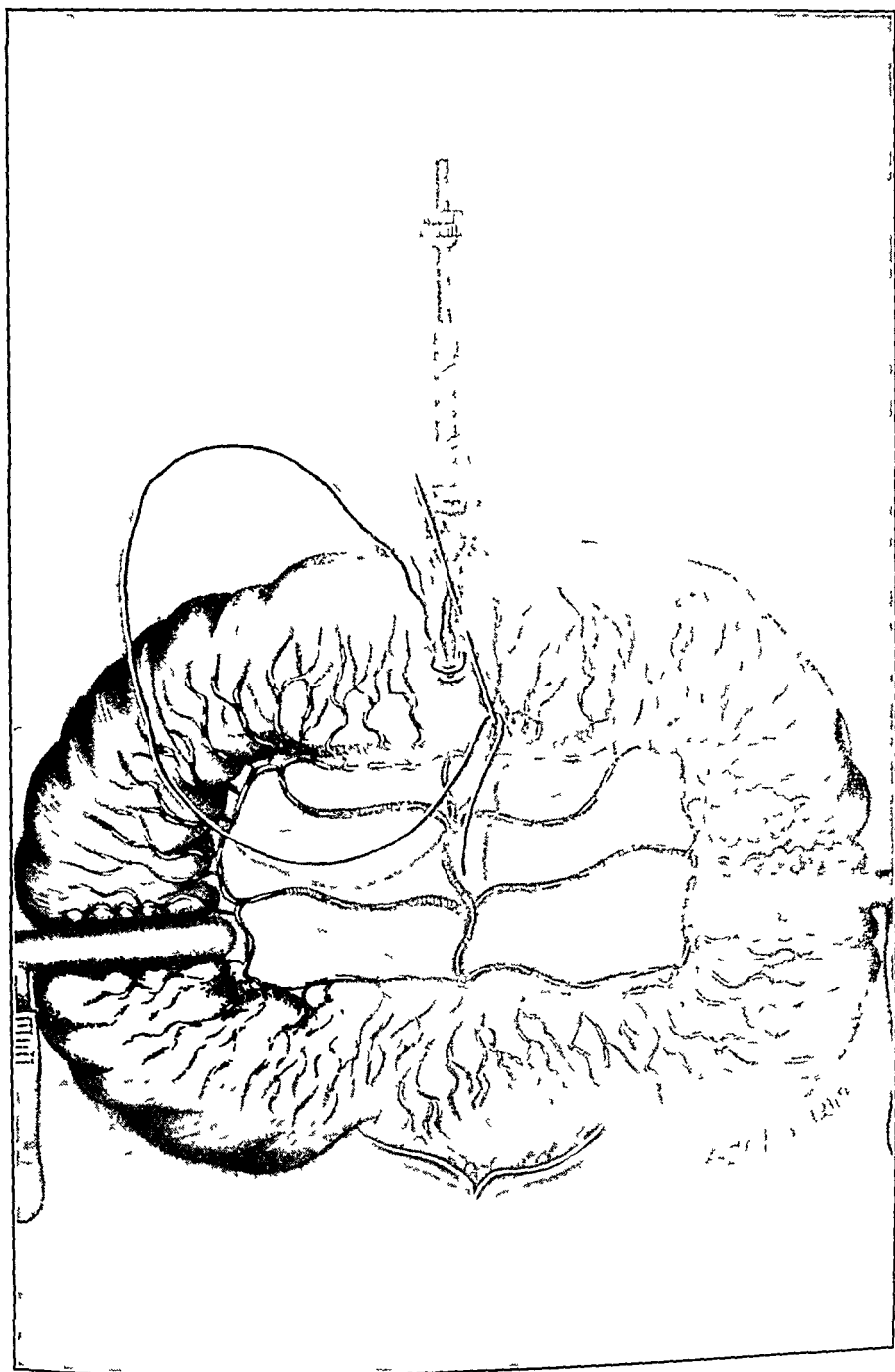


FIG 9—Intestine turned over and suture of other side



(3) The bowel is divided into two sections by the holder (Fig. 7), instead of into three, as with the suspension loops.

(4) A continuous suture is used in place of an interrupted one. This, however, is simply a matter of choice or convenience.

Before placing the holder into position, the mesentery is treated as follows:

After threading two intestinal needles with a long piece of silk, a needle at each end of the silk, one of the needles penetrates the entire thickness of one end of the bowel, from within out, very close to the centre of its mesenteric border, so that when it emerges from the bowel it enters into the mesenteric triangle formed by the two folds of peritoneum and the bowel wall. The peritoneum is now picked up by the needle close to the apex of the triangle; then the peritoneum of the opposite end of the bowel is included in a corresponding position, after which the needle enters this end of the bowel, penetrating all coats, as it did in the first end. (If the thread were now to be tied, the knot would ride directly over the juncture of the incised mucous membrane of both ends of the bowel, leaving both the mesenteric spaces or triangles still gaping.) The needle is now returned to the first end in the same manner, the peritoneum on the opposite end being included in the suture, the stitch running very close and parallel to the first insertion. (Fig. 4.) The mesentery should divide the thread into two equal parts, after which it is tied.

In tying, those portions of the bowel wall of both ends, which are included in the stitch, are drawn into the triangular spaces, or *vice versa*, the triangular spaces are drawn over the bowel walls, and are thus obliterated. The knot is on the inside of one end of the bowel, and there is a continuous layer of peritoneum across the line of the mesenteric approximation (Fig. 5), restoring it to its normal relations. The needles now penetrate the bowel wall close to and on either side of the knot. (Fig. 6.)

The intestine holder is now introduced into the bowel, so that the distal arms (1) are placed along its mesenteric



border; and the other arms (2), when holding the intestines under proper tension, are directly opposite the mesenteric attachment, thus holding the intestine in a flattened condition and dividing it into two halves. (Fig. 7.) Care should be taken to push enough of the intestine over the arms so that there is little or no tension at the ends of the arms. When the intestine is thus held in this position by the holder, the threads may be seen protruding from either side of one end of the intestine close to its mesenteric border. (Fig. 7.)

One-half of the intestine is now sutured. With one of the protruding threads a right-angled continuous suture is used, which includes all coats of the bowel. (Fig. 7.) As the stitches are inserted the thread is pulled taut, so that the inserted thread disappears from view, assuming a subperitoneal position. (Fig. 8.) As soon as the point is reached where the stem of the holder protrudes from the lumen of the gut, the final stitch, which is a half-stitch, is taken to the opposite side, a stitch from without in, and one which remains in the gut. (Fig. 8.) This final stitch is very close to the corresponding final stitch of the other side of the intestine, which also protrudes through the same end of the bowel.

The instrument is now turned to the other unsutured side of the intestine, which is now sutured in the same manner as the first one. (Fig. 9.)

The instrument is made to fold and is withdrawn through the very small remaining opening. The final knot is now tied, as described by Connell.

As is shown in Fig. 10, the two loose ends of the thread are ready to be tied within the lumen on the same side of the mucous membrane. Fig. 11 demonstrates the next step, the tying of the ends, with knot on the mucous membrane. A needle armed with thread is inserted, eye first, from the opposite side in the line of the previously tied stitches, and made to present near the two ends of the stitch to be tied. The thread of the eye of the needle is then loosened sufficiently to form a loop, through which the end of the inserted stitch is passed.

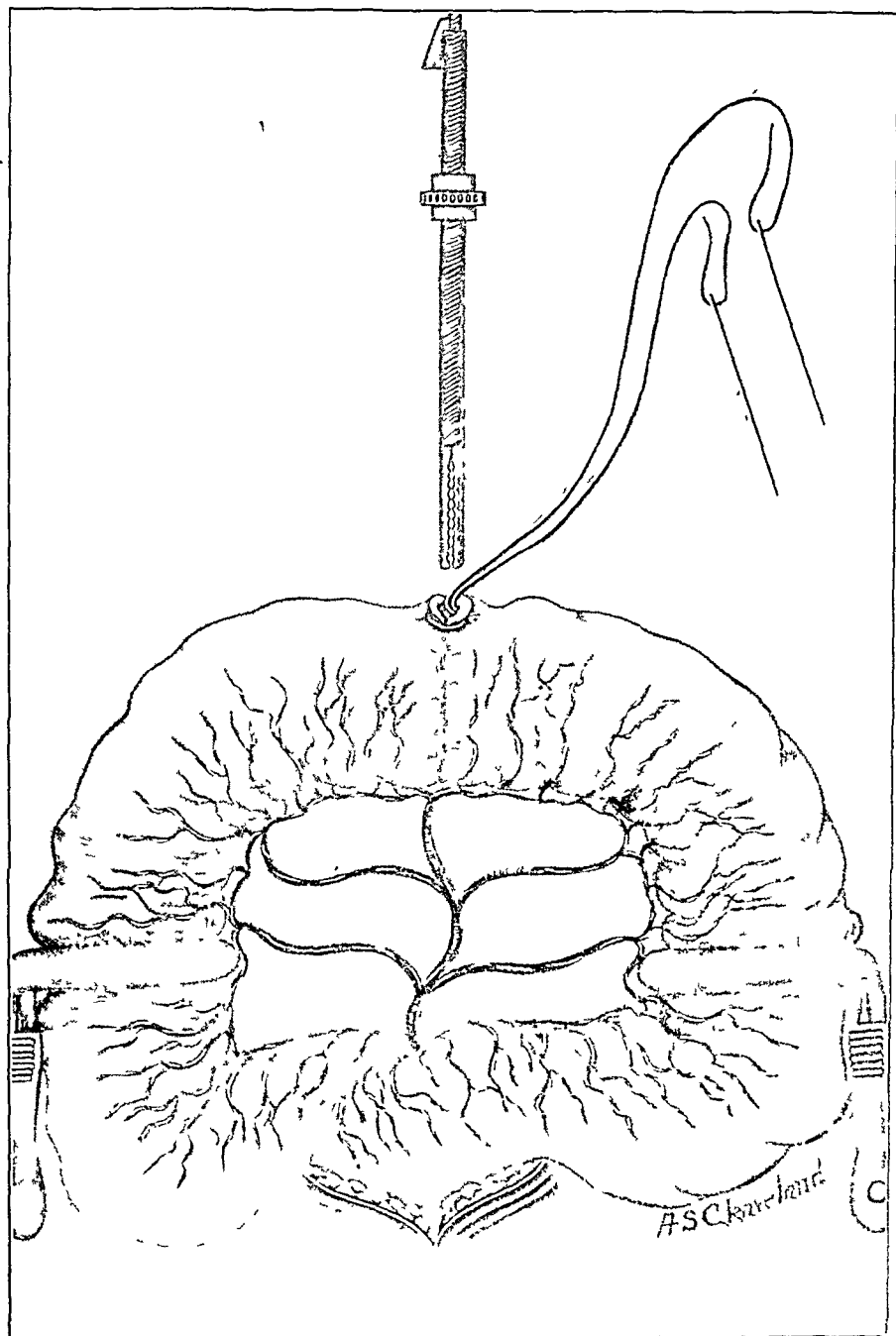


FIG. 10—Intestine holder folded and removed from bowel.



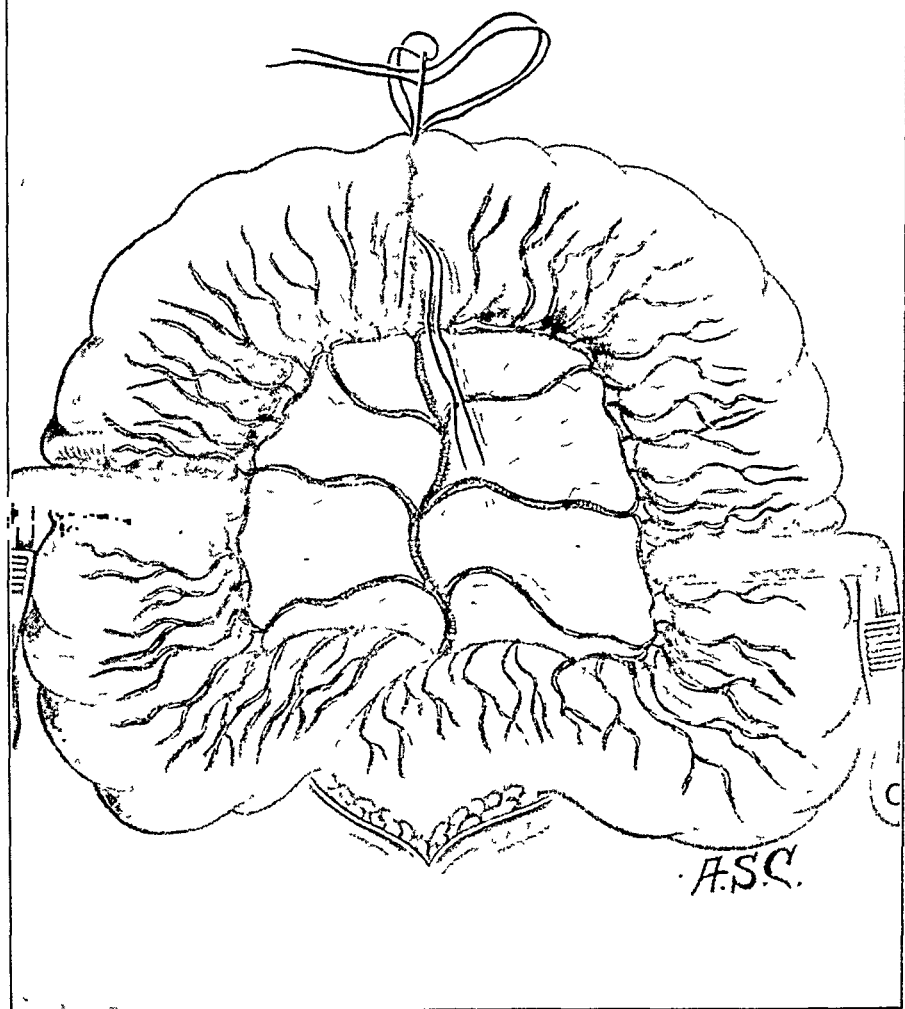


FIG. 11.—Method of bringing sutures in position for final knot



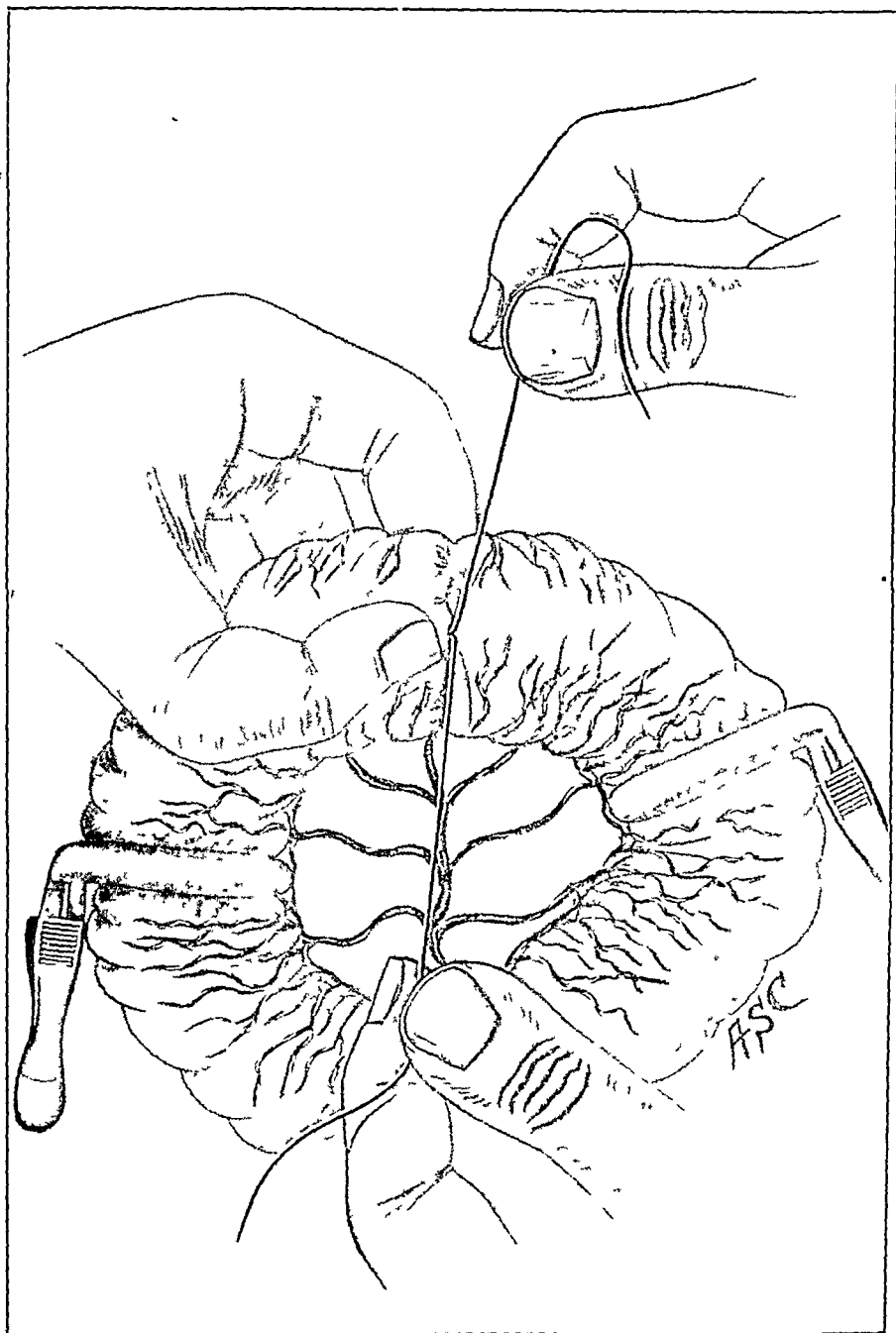


FIG 12—Final knot



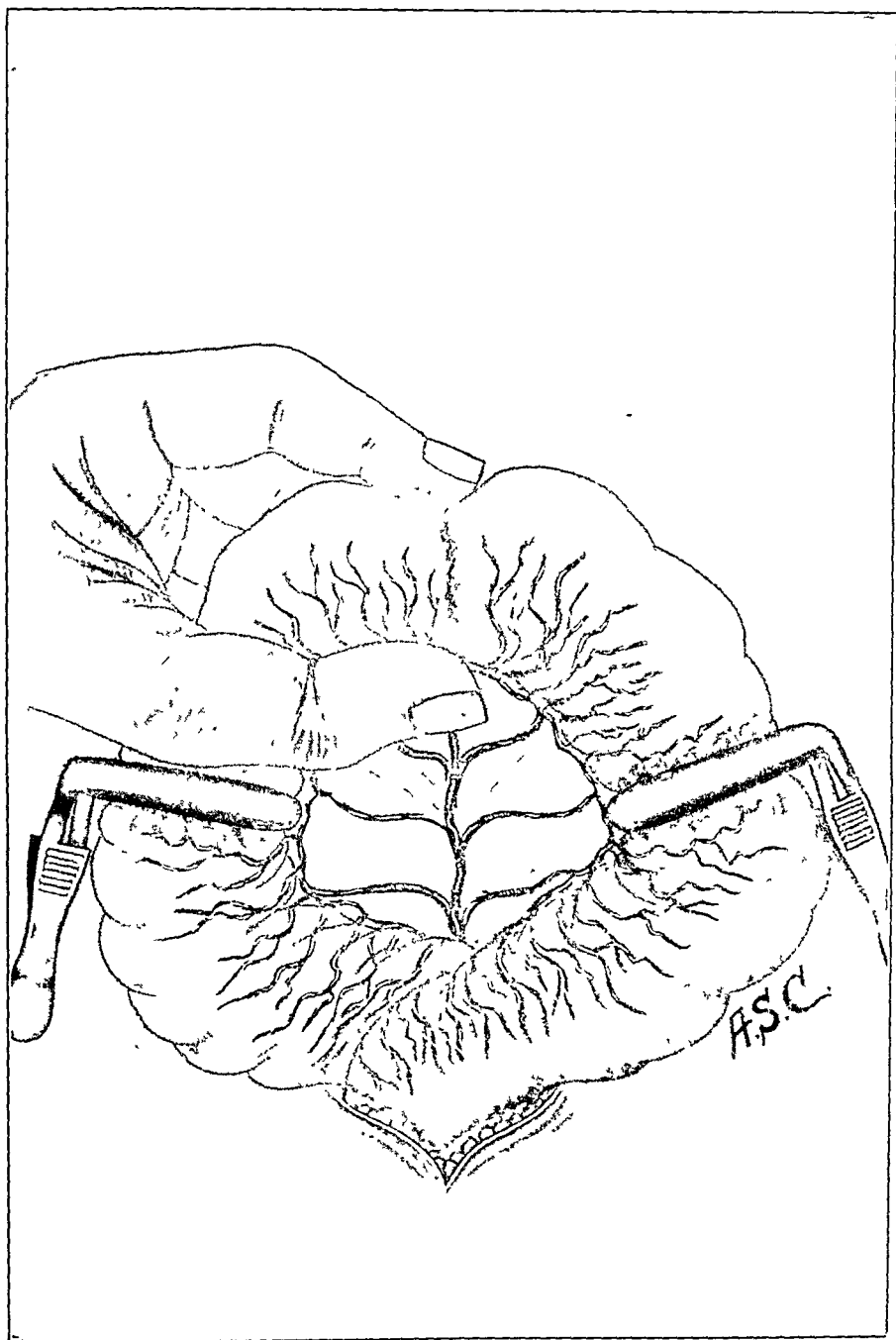


FIG. 13.—Suture completed.





The needle with its thread is then withdrawn, bringing with it on the loop the three ends of the stitch to be tied.

Fig. 12 illustrates the ends, ready to be tied, presenting on the extreme surface of the bowel in the line of union. When traction is applied to these threads the bowel is flattened, thus bringing the mucous coat on which the knot will be located in close contact with that of the opposite side. The ends are tied finally in a square knot and then cut off close. Upon manipulating or slightly stretching the gut, the final knot will slip into the bowel in the proper position. Fig. 13 shows the suture completed, all of the knots on the mucous membrane, and the suture invisible from without.

# LARYNGECTOMY UNDER EUCAINE ANÆSTHESIA, WITH REMARKS ON THE TECHNIQUE OF THE OPERATION.

By GWILYM G. DAVIS, M.D., M.R.C.S. (ENG.),

OF PHILADELPHIA,

*SURGEON TO THE EPISCOPAL HOSPITAL, ETC.*

A STOUT, well-built man of forty-six years of age was referred by the laryngologist of the hospital, Dr. Joseph Gibb, to the wards for the removal of a carcinoma of the larynx. There was no family history of tumors or phthisis, nor had he had syphilis. He had been a moderate drinker and smoker. His present trouble began one and a half years previously, with hoarseness, cough, and slight tenderness in the larynx. Six months ago he experienced difficulty in respiration and his breath became offensive. During the last month the attacks of dyspnoea became more frequent, so that finally the patient was unable to get any sleep whatever, and death seemed imminent from suffocation. He had not lost much flesh. The laryngoscope showed an ulcerating carcinoma of the larynx. There was apparently no glandular involvement. The case seemed eminently suitable for operation, which, however, promised to be difficult on account of the short, thick, full neck. The thyroid cartilage was not at all prominent, but level with the adjacent surface. The parts to be operated on were thoroughly cleansed on the day before the operation, and covered with gauze wet with bichloride solution. Previous to the operation the neck was again cleansed. The assistant and nurse who handed sponges wore rubber gloves, as did also the operator, until after the trachea had been divided and removal of the larynx proper had begun.

The operation was commenced by injecting with a sterilized syringe, previously boiled, 1 per cent. eucaine B. solution into the skin from just above the hyoid bone to the top of the sternum. A straight incision was made through this anæsthetized area. By gradual dissection, aided by the injection of a few drops of

eucaine solution laterally into the parts, the sternohyoid and sternothyroid muscles were separated and turned aside, the deep fascia and isthmus of the thyroid gland cut and the trachea exposed. Bleeding vessels were carefully clamped, as little tissue as possible being included in the grasp of the forceps. The sternohyoid and thyroid were detached above to allow of greater retraction. The trachea was cleared down to the suprasternal notch, the recurrent laryngeal nerves being pushed backward. Only five or six tracheal rings could be exposed instead of the nine or ten usually found above the sternum. Operating was proceeded with slowly and very carefully and gently, so as to avoid giving unnecessary pain; quick, rough handling would have caused laryngeal spasm. He was permitted to rest at comparatively short intervals, as he would ask to be allowed to get his breath. The stenosis was marked, and he could only breathe at all by considerable effort. The trachea having finally been fully exposed anteriorly and at the sides, an incision was made across it just below the cricoid cartilage. As bleeding followed the cut, in order to prevent the blood from getting into the trachea, a few drops of eucaine were injected, and the division of the front and sides completed with a few strokes of a Paquelin's cautery-knife. Eucaine was again injected into the mucous membrane of the posterior wall, and after scoring it with the cautery, was divided with the knife. It was then carefully detached from the œsophagus behind and brought forward, a piece of gauze being placed behind the upper portion of the divided trachea to prevent access of blood or infection from the larynx above. It had been the intention to administer chloroform as soon as the trachea had been opened, but the operation had progressed so satisfactorily under local anæsthesia that it was continued. Eucaine was injected alongside the thyroid cartilage, and the remaining attachments of the sternohyoid and omohyoid, sternothyroid, thyrohyoid, and part of the inferior constrictor muscles, and the rest of the soft structures separated to the posterior border. The rubber gloves being now removed, the hands were again disinfected by the permanganate method. The lower portion of the larynx was lifted up and the upper portion of the œsophagus separated from its posterior surface well up on the arytenoid cartilages. The remaining attachments were divided along the left posterior border of the larynx, the latter being

drawn to the patient's right. On cutting the structures towards the upper portion the patient flinched, probably when the superior laryngeal nerve was divided. Bleeding from the superior thyroid artery and its branches was quite free, necessitating the application of hæmostats. The thyrohyoid membrane and base of the epiglottis were divided and the detachment proceeded with down the right side and the complete larynx removed. The hæmostats were taken off and a few vessels ligated with catgut. The sides of the upper portion of the œsophagus were approximated with a couple of catgut sutures. The trachea was stitched in the lower angle of the wound with silk sutures, the skin being slightly drawn in. The wound above the trachea to the hyoid bone fell nicely together, and two silkworm-gut sutures kept the parts well in apposition. The line of the wound and surface adjoining were painted with Whitehead's paint (an ethereal solution of iodoform and benzoin). On the completion of the operation the patient was comfortable, breathing quietly, with a pulse of 104, and not the slightest evidences of shock. He was placed in a room the temperature of which never fell below 80° F., the air being kept moist by boiling water. Gauze was placed over the tracheal opening to prevent the entrance of dust. In all seventy-five minims of a 1 per cent. solution of eucaine B. were used. The day of the operation was cold, and it was snowing.

*Subsequent Course.*—He passed a somewhat restless night, being disturbed by coughing. On the second day his temperature rose to 103° and his pulse to 120, and considerable stringy mucus came from the trachea. An alkaline steam-spray was used at intervals. On the third day the temperature was 102° and pulse 120; respirations, 24 to 30. He coughed considerably, and some of the silk stitches had cut through and were removed. He could speak in a whisper, and was able to swallow some milk and brandy, a few drops appearing at the wound. At times he was dyspnœic, apparently from mucus in the trachea. He passed a very restless night, and on the fourth day his temperature was 103° and pulse 112; respiration, 24. His pulse was feeble; he had profuse sweats and discharged large amounts of mucus from the trachea. On the fifth day he suddenly became wildly delirious and jumped out of bed. On being returned, he made no more attempts to move, and gradually became unconscious. His pulse rose to 136, his temperature from 102.5° to 109°, his

lungs filled up and he died. His urine at the time of operation was 1028 specific gravity, acid, with a faint trace of albumen but no casts; hyaline casts had, however, been found three days previously. He passed twenty-one ounces the second day, eighteen the third day, and sixteen the fourth.

*Post-mortem Examination.*—This showed an intense congestion of the tracheal and bronchial mucous membrane as well as of the kidneys, liver, and spleen. The wound from the trachea up was united by primary union. The trachea was separated from the skin about half a centimetre, and behind its upper edge were a few drops of pus. Streptococcus growths were obtained from the various organs, and Dr. Robertson, the pathologist, gave streptococcus infection as the cause of death.

Inasmuch as the technique of the operation of laryngectomy is still unsettled, it may be profitable to consider what light this case may throw on some undecided points. Keen (*ANNALS OF SURGERY*, July, 1899) gives as the chief causes of mortality, weakness due to the disease previous to operation, shock, hæmorrhage, and aspiration pneumonia; this latter being the greatest danger. Butlin ("Operative Surgery of Malignant Disease," page 193) gives in addition collapse and paralysis of the heart as a frequent cause of death (seventeen out of eighty-four cases), and states there is no sure means of guarding against it. In the present case the patient was not materially weakened by the disease. Hæmorrhage and shock were avoided by careful hæmostasis. In the attempt to avoid infection and pneumonia are involved the questions of anæsthesia and treatment of the trachea. Inasmuch as pneumonia is liable to result from the entrance of blood into the air-passages, and as this is favored by the use of general anæsthetics, it was decided to at least begin the operation with local anæsthesia, and resort to chloroform later, if necessary. As the operation progressed, it was found possible to complete it without general anæsthesia. The main objection to local anæsthesia is that it prolongs the operation considerably. The patient only showed signs of pain when the superior laryngeal nerves were cut. When asked afterwards if the operation had

been very painful, he said no. He was, however, a courageous man, and may have belittled any distress which he may have felt, but at all events he did not interfere with the operative procedures. What few drops of blood flowed into the trachea were immediately expelled, so that infection did not arise from this cause. As the trachea was brought forward when divided, there was no necessity to use the Trendelenburg position, and the operation was done with the patient in a reclining position, the shoulders being elevated. Congestion and bleeding would have been more marked with the head lowered.

The most important undecided point is as to the desirability of a previous tracheotomy. While in many cases tracheotomy would be easy of performance and quick in healing, in others, particularly for existing carcinomatous disease, it may in itself prove fatal, or leave the parts in a quite unfavorable condition for a subsequent removal of the larynx. In 1895, Delavan, in Dennis's "System of Surgery," Vol. iii, stated that "nearly all authors agree that a preliminary tracheotomy is necessary, in contradistinction to the views held by the earliest operators." Notwithstanding this, we find Briddon (*ANNALS OF SURGERY*, Vol. xxi, page 59) operating without it, and stitching the trachea in the wound, a fatal result following from pneumonia, although no blood had found its way into the respiratory tract. Also, William W. Seymour (*ANNALS OF SURGERY*, 1897, Vol. xxvi, page 637) divided the trachea and brought it into the wound. Butlin (second edition, 1900, page 193) says, "Tracheotomy is performed either at the time of the extirpation or some time previously, according to the condition of the patient and the views of the operator." Francis W. Murray (*ANNALS OF SURGERY*, Vol. xxv, 1897, page 600), in an article on "Preliminary Tracheotomy in Operations on the Air-Passages," states that "when a patient is strong and in good general condition, I can see no objection to performing the preliminary and the major operation at the same sitting." Mr. Watson Cheyne also advocated the tracheotomy at the time of the major operation.

Finally, W. W. Keen, in his address before the American

Surgical Association (ANNALS OF SURGERY, July, 1899), in reporting a case, states that he did a tracheotomy at the time of operation, but that he was strongly of opinion that it would be better to omit tracheotomy entirely. Thus it will be seen that surgical opinion was almost uniformly against the advisability of doing a preliminary tracheotomy. Since operating on the case, I have read Dr. D. Bryson Delavan's article in the *British Medical Journal* of November 27, 1897. His views are worthy of quotation. He favors a preliminary tracheotomy because the use of a tube is irritative, and a few days will allow this irritation to subside; the local condition ameliorates; time is saved in performing the operation, and shock and hæmorrhage are less, and the administration of the anæsthetic is easier. He continues, "Lastly, a point of great practical importance has lately come to my notice in connection with the method of laryngectomy practised by Dr. J. Solis-Cohen. In that operation the larynx is entirely removed, and the severed end of the trachea is turned forward and fastened to the external incision in the neck. In a case of this kind orally reported to me several months ago there had been no early tracheotomy, and, in consequence, there was no cicatricial adhesion of the parts; and when the edges of the trachea were stitched to the cervical wound, there was free movement of the former with every effort of respiration, and the sutures failed to keep the parts properly together. Thus union could not take place, the operation was a failure, and the patient died." Dr. Delavan's precise words are given because they state exactly what occurred in the present case. The patient would not lie down, claiming he was more comfortable in a reclining position supported by pillows. Whenever he coughed, which was frequently, the trachea jumped up and down, pulling violently on its attachment to the skin, so that by the third day some of the stitches had cut through and were removed. That this was the main cause of the unfavorable issue, I have not the slightest doubt. Had a preliminary tracheotomy been performed, the trachea would have been fixed in place, and there would have been no ulcerating wound constantly kept irri-



tated by the tugging of the trachea on the skin. That infection was introduced at the operation is not probable in view of the care taken to guard against it. The wound from the divided trachea up to the hyoid bone healed by primary union. Just on the surface posterior to the upper edge of the divided trachea were a few drops of pus; there were none between the posterior surface of the trachea and œsophagus. There was no pocket of pus anywhere. The edge of the wound around the trachea was inflamed, and it must have been here that the infection started in spite of the efforts made to prevent it.

An interesting feature of the case was the fact that soon after the operation he could talk in a low whisper sufficiently clearly to make himself easily understood. No œsophageal tube was left in the wound, as this would have caused a fistulous opening and prevented healing. It was probably unnecessary, as he could swallow fairly well on the third day.

I was unwilling to attempt the use of a general anæsthetic for the tracheal operation, because I have had suffocative symptoms supervene in other cases, and Seymour, in his case, had to hurriedly open the trachea and resort to artificial respiration to save his patient.

To sum up. It is feasible to remove the larynx under eucaine anæsthesia. If the two operations are done simultaneously, and a favorable course is pursued, the result will be brilliant, the patient being "out of bed on the fourth day." It is my belief that Delavan is right, and that preliminary tracheotomy ought to be done. We should not sacrifice safety for brilliancy. That the leaving of an œsophageal tube projecting from the wound is probably unnecessary, the patient swallowing on the third day. The wound need not be tamponed, but can be closed from the upper edge of the trachea to the hyoid bone. These patients can make their wishes understood by speaking in a short time after the complete removal of the larynx. In this case it was found comparatively easy to remove the larynx from below upward, going up one side, then across at the hyoid bone, and down the other.

## DOUBLE URETER.

REPORT OF A NEPHRECTOMY DONE UPON A YOUNG CHILD WITH  
THIS CONDITION PRESENT.<sup>1</sup>

By JOHN EDWARD SUMMERS, JR., M.D.,

OF OMAHA, NEBRASKA.

DOUBLE ureter is comparatively uncommon. Out of 726 consecutive autopsies made in the New York Infant Asylum, four cases of "supernumerary ureters" were observed. In another series of autopsies of about one-half this number of cases made in two other institutions only one case of any kind of kidney malformation was seen (Holt). Double ureter proper may be found on both sides or on one side alone, more commonly the left side. When double ureter exists there are two pelves, an upper and a lower, either of which may be the larger, and they do not connect. The ureters either join before reaching the bladder or remain separate and enter the bladder on the same side at two distinct points. I have examined one post-mortem specimen of double ureter *on both sides*. Each ureter entered the bladder separately on its corresponding side. In fused kidneys most frequently we find two pelves and two ureters which enter the bladder in the usual manner; there may be only one ureter, and this enter the bladder in the mesial line. Fused kidneys, although usually placed in the middle line, may be situated as a mass upon one side of the spinal column, having two ureters entering the bladder separately on the same side or on opposite sides.

In solitary or unsymmetrical kidney, an extremely rare condition, found once in about 3500 post-mortem examinations, the rule is that there is a single ureter which enters the bladder

<sup>1</sup> Read before the Missouri Valley Medical Society, September, 1900.

on the same side on which the kidney is found. In such an instance there is no evidence of a rudimentary kidney on the other side, and in about 10 per cent. of these cases the supra-renal capsule is wanting. It was my fortune to see a post-mortem examination, at the New York Hospital twenty years ago, upon the body of a well-nourished young woman dead of "idiopathic peritonitis." There was found a large solitary kidney on the left side (one ureter), which was in a state of chronic parenchymatous nephritis. There was also a bicornuate uterus, and the left lung was divided into three lobes and the right lung into four lobes. In another case, the post-mortem examination having been made by my preceptor (I missed the autopsy), a large solitary kidney (one ureter) was removed from the body of a tall, thin man of about fifty years of age, dead of nephritis.

A congenitally atrophic kidney on one side may have a ureter varying from an impervious cord to a practically normal tube entering the bladder in the usual way. It is important to observe that a solitary kidney may have two ureters whether there be a true congenital absence or atrophy of the opposite kidney (Henry Morris).

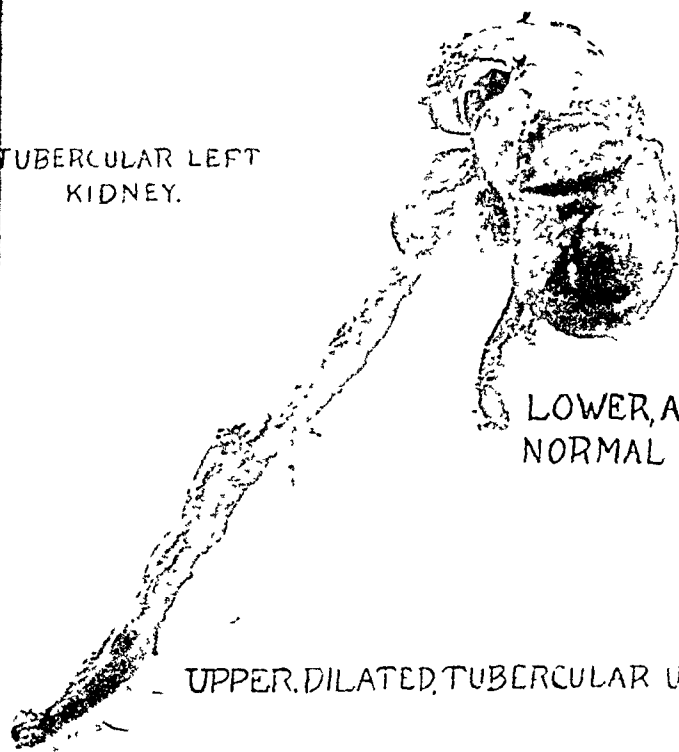
My own case of double ureter on the left side with probably the same anatomical arrangement upon the right side may be briefly stated. A fairly well-nourished delicate female child, two and a half years old, was referred to me, May 26, 1900, by Dr. W. O. Bridges. The father is an epileptic, and on the mother's side an aunt had died from pulmonary tuberculosis. The child suffered from irritability of the bladder, wetting the bed, napkins, etc. The urine secured by catheterization was acid, cloudy, and precipitated a whitish purulent deposit. Tubercle bacilli were found in abundance. A tumor, evidently the left kidney, was easily palpable.

My Harris segregator and instruments for catheterizing the ureters are only intended for adolescents or adults, hence there was no attempt towards determining the condition of each kidney; in fact, this was deemed unnecessary. Nephrectomy was advised and carried out in the Clarkson Hospital, May 29, 1900.

TUBERCULAR LEFT  
KIDNEY.

LOWER, APPARENTLY  
NORMAL URETER.

UPPER, DILATED, TUBERCULAR URETER.





An oblique incision was made and the diagnosis of tuberculous kidney verified. The right kidney was palpated through a button-hole opening made in the right side. This kidney was somewhat enlarged, or rather elongated and lobulated, and at the time I thought it tubercular. We decided that the only hope for the child was the removal of the palpably and visibly diseased left kidney. This I did after being considerably puzzled at first before recognizing that I had two ureters with separate pelves to deal with,—an upper much enlarged tubercular tube, a lower normal tube. The former was followed well down below the pelvic brim, the latter for a short distance only. They were removed together with the kidney. It is my opinion that these ureters entered the bladder alone; had they joined before entering the bladder, it is probable the lower ureter would have shown some sign of infection.

Healing was *per primam*, and the child left the hospital June 18; at that time there was still some irritability of the bladder, and tubercle bacilli (from the stump of the upper ureter probably) were to be found in the urine. Since then she has done well, and a few days ago was reported in a good general condition. The after-treatment consisted in the giving of urotropin and methylene blue.

In connection with the subject of double ureter, the writer wishes to draw attention to the fact of the possibility of error in using "segregators" to determine the presence and condition of both kidneys. It is conceivable, also, that mistakes might occur when reliance is placed wholly upon ureteral catheters.

Prior to an extraperitoneal nephrectomy of election, it is wiser, in addition to using all other aids, to palpate through a button-hole opening for the presence of any gross pathological condition of the opposite kidney.

# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, October 10, 1900.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

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## ARTIFICIAL BRIDGE OF THE NOSE.

DR. ROBERT H. M. DAWBARN presented a man into whose nose he had introduced, one year previously, an artificial bridge for the correction of a deformity due to a fracture of the nose, sustained at the age of four and a half years. Practically, he had no bridge, so flat was his nose; but the cartilaginous portion was intact. The result is highly satisfactory. No one could suspect that his nose had ever been in need of surgical care. The artificial bridge is entirely comfortable to him; indeed, it does not seem to him otherwise than as if one of his own bones; and judging by the previous experiences of the reporter, to the number of about a dozen, and dating back, two of them, fully five years, he will wear it without trouble all his life.

Dr. James E. Newcomb, of this city, who recently examined him, says that he can just recognize by reflected light within the nose, through the soft parts, the faint outline of the base of the new bridge.

In all these cases Dr. Dawbarn had used no metal, but a plastic material, dental pink gutta-percha. This was selected for numerous reasons. First, the assurance of dentists that no material will remain when crowded beneath a gum with less resultant irritation than this. Second, it is by scalding water easily sterilized, and when so heated can be moulded like the softest putty, but at the bodily temperature becomes nearly as hard as pine. Because it can be so moulded, it is easy to make it exactly the right size and shape by fitting it upon the skin of the nose, where the defect is, before any cutting is done. Finally, the

chemistry of the body does not attack it at all, no matter how long it remains in place. It is so shaped as to have a broad base of support, and much narrower where the skin covers it. The technique of the operation is as follows: The nostril on one side is most carefully clipped free from hairs, and both sides are syringed out repeatedly and packed for twelve hours with wet boric gauze. This is not removed until after the operation, thereby preventing blood running back into the pharynx, to the operator's annoyance, but is replaced by fresh boric gauze when the operation is ended.

Under major anæsthesia, and with a slender, small-bladed scalpel, a cut is made well within the nostril, large enough to admit the new bridge endwise. The skin is then freed from the subjacent bone along the whole length of the nose, and perhaps nearly as far outward as the infra-orbital vessels upon both sides. This dissection is made to hug the bone as closely as possible. It must be guided by the sense of touch only, and is necessarily as speedy as possible, as blood is pouring out from a multitude of little vessels divided. If bony prominences need removal, this is done by narrow chisel through the same path. As soon as the skin lies perfectly loose where formerly it closely followed the bones, the bleeding is checked by a long half-inch strip of sterile gauze, dampened and well rubbed with sterile aristoI; its edges and ends hemmed to avoid loose threads, and compression applied over this. In ten minutes all oozing will be quite checked.

Then the bridge of gutta-percha, prepared and sterilized before the patient was anæsthetized, is slipped into place. It is held there by a single steady strip of zinc oxide adhesive plaster across the face.

Formerly, he sewed up the wound in the nostril. This was not easy, and now he thinks it worse than needless; for an opportunity for drainage from the lowest point is desirable. This cut takes care of itself without trouble.

Nothing could be simpler than this technique; and all his cases had been grateful patients except the first. In that case he was too ambitious. The patient, who had always, even before his accident, been characterized by a somewhat distressing pug nose, demanded a Roman organ instead. The general shape of his features seemed to give consent, so the new bridge was moulded accordingly, and all went well for a time. But finally,



at the highest part of the Roman arch, the skin showed signs of tension. It slowly sloughed, and when the slough came away the pink gutta-percha was revealed over an area as large as a finger-end.

It is of interest, in conclusion, to record the fact that in two of these cases there was suppuration following the operation,—this patient was one of them, and that, nevertheless, the final result was equally good. This satisfactory outcome was doubtless partly because the drainage was so perfect, from the lowest point of the wound, and partly because the bridge, a perfectly solid and smooth mass, presents no crevices nor spaces in which pus can be retained. It is almost impossible to be sure of effective sterilization of the interior of the nose, and he had congratulated himself upon having in this operation no worse proportion of infection than that just mentioned.

DR. F. W. GWYER said he could corroborate the statement made by Dr. Dawbarn that the pink gutta-percha remained apparently unaffected by the fluids of the body. He had used the material in a case of artificial nasal bridge, operated on several years ago; the patient had been lost sight of, and he could not state what the ultimate outcome of the operation had been. In a case of facial neuralgia, the patient having been previously operated on by another surgeon and there having been a recurrence, after removing a portion of the superior maxillary nerve, he had inserted a plug of this composition to occlude the foramen rotundum; the patient had been seen several years after, and, while the neuralgia had again returned, there had been no trouble experienced from the presence of the foreign body.

DR. L. A. STIMSON said that at a meeting of the Surgical Society about six or seven years ago he showed a patient into whose nose he had introduced a gutta-percha plate for the correction of a similar deformity; and within a year or two a Boston surgeon had reported several cases similarly treated. In his case, Dr. Stimson said, he introduced the plates through an external incision, which method was perhaps preferable to an incision made within the nostril, as there is less likelihood of subsequent infection of the wound. In no instance did the plates give rise to any trouble. In one case he removed the plate after a year to insert a longer one, and then noted that the condensation of tissue about the plate was sufficient, at least temporarily, to main-

tain the corrected position of the nose after the plate was taken out.

In one case of nasal deformity, Dr. Stimson said, he used an aluminum plate; in another a packing of silk thread, but the end of the thread protruded at the incision after two or three days, and he removed it.

DR. JOSEPH D. BRYANT said that his first experience in the rectification of a deformity of the nose was about ten or twelve years ago; he employed for the purpose a piece of gold wire, which answered very well, and did not give rise to any trouble for about four years. Then the patient returned and showed a line of discoloration on the nose along the border of the wire; the wire was removed and a strip of celluloid substituted, which rectified the deformity even better than the wire, and up to the present time (now over four years) it has given rise to no trouble.

Dr. Bryant said that platinum has been used in a number of cases to serve the purpose of an artificial nasal bridge, but its period of usefulness is limited, probably, to about three years at the most. For that reason gutta-percha and celluloid appear to be preferable.

DR. DAWBARN rejoined that in the report of this case he did not make, nor intend to make, any claim as to the question of priority. He was pleased to learn that Dr. Stimson had previously employed this material for the same purpose and could indorse its value. The main question at issue seemed to be whether the gutta-percha bridge should be introduced through an external incision, as Dr. Stimson had done, or by the method, followed by himself, from within. Personally, he preferred the latter. In a number of cases where he has employed it, in addition to the case reported to-night, the method proved simple, the deformity was entirely corrected, and there was no resulting scar.

## RESULT OF OPERATION FOR SPINAL TUMOR.

DR. A. J. MCCOSH presented a man, thirty-five years of age, who had always enjoyed good health up to about two and one-half years ago, when he began to suffer from pains in the left lower extremity, which were regarded as sciatic in origin. The pains were intermittent in character and occasionally involved the right leg, although they were always more severe on the opposite side of the body. For nearly two years he was under treatment

for sciatica, various drugs, electricity, and the Paquelin being tried without much resulting benefit.

The patient came to Dr. McCosh for relief in November, 1899, asking to have the nerve stretched or something else done. Examination showed a certain amount of tenderness along the course of the left sciatic nerve; jolting also caused pain at the lower end of the spine, and there was some stiffness in this region. This led Dr. McCosh to believe that the trouble was in the lower spine, and the patient was referred to an orthopædic hospital, where it was suspected that he was suffering from caries of the lower vertebræ. He was fitted with a brace, which he wore for only one week, and which seemingly aggravated his symptoms.

In May, 1900, the patient was again seen by Dr. McCosh; during the winter his symptoms had become much worse. His pain was very severe, especially along the left hip and thigh. There was partial atrophy of the muscles of the leg and thigh on this side, and the reflex of the left knee was completely lost. There were irregular areas of anæsthesia along the buttocks, thigh, and calf. His pain was so severe that it had to be controlled by anodynes; and during the few days which intervened between his admission into the hospital and the operation several grammes of morphine were daily given hypodermically.

The symptoms at this time led Dr. McCosh to the conclusion that there was a tumor at the lower end of the spine. The patient was examined by Dr. Pearce Bailey, who agreed in the diagnosis, and located the growth at the beginning of the cauda equina. An operation for its removal was done on May 22, 1900. An incision was made along the spine, from the eleventh dorsal to the third lumbar vertebra, and the spines and laminæ of the twelfth dorsal and the first and second lumbar vertebræ were removed. From the lower border of the eleventh dorsal to the lower border of the second lumbar no cord could be seen, the canal being occupied by a bluish-looking mass, soft, and slightly elastic to the touch. Between the second and third lumbar vertebræ some nerve-filaments were seen pushed over to the right side. The dura was opened and a tumor disclosed. After chiselling away the lamina of the twelfth dorsal vertebra, the cord was found; it was comparatively normal in appearance. The tumor, which was about two inches long and one-half inch in diameter, was thereupon removed with scissors and spoon, and its remnants scraped

away. It extended up as far as the middle of the twelfth dorsal vertebra; the cauda equina had been pushed to the right and anterior to the tumor, and in that position had been compressed by it. Although the growth was thoroughly removed, it was thought that the cord itself was infiltrated to some extent. The dura was sutured and two gauze drains inserted. Only one dose of morphine was required subsequent to the operation, and within twelve hours a marked improvement in his symptoms was noticed. The wound healed without any trouble, and the patient left the hospital on the thirtieth day after the operation. The anæsthetic areas gradually disappeared, the tendon reflex came back, and the man has gained eighteen pounds in weight. He has had no more pain; he feels perfectly well, and his back is as strong as ever. In his work he is obliged to lift plates weighing sixty pounds to a shelf above his head, and he can do this without causing him any trouble.

The tumor was pronounced by a pathologist to be a round-celled sarcoma. The patient gave no specific history.

## RESULT OF OPERATION FOR PERINEAL FISTULA.

DR. ALEXANDER B. JOHNSON presented a young man, twenty-one years of age, who, when first seen by him, in July, 1900, had a large perineal opening through which almost his entire urine escaped, the sequel to a perineal abscess following a gonorrhœa one year before. There was no raw surface, the skin and mucous membrane being continuous over the scar tissue in the perineum. In order to close the fistula, the mucous membrane of the urethra was dissected free from the scar tissue and inverted inward, and the orifice closed with fine catgut. Then, after dissecting away the scar tissue, the wound was closed by the superimposed flap method. The patient urinated voluntarily through the urethra at the end of forty-eight hours. There was a slight escape of urine through the perineum, and this gave rise to a temporary infection of the wound of moderate degree. The patient left the hospital in a few weeks with a sound perineum. His urethra now takes a 32 F. sound with ease; his urine is normal and free from catarrhal ingredients.

Dr. Johnson said that in several operations of this class the wound had become slightly infected, but this had never impaired the ultimate integrity of the perineal wall.

## TRAUMATIC CUBITUS VARUS.

DR. L. A. STIMSON presented a patient who had recently sustained supracondyloid fracture of the humerus. The speaker said that at one of the meetings of the Society last spring he had read a paper upon the subject of traumatic cubitus varus (*ANNALS OF SURGERY*, September, 1900, Vol. xxxii, p. 301), and his object in showing this case now was to illustrate what he regarded as one of the possible factors of this deformity.

In the treatment of this form of fracture the forearm is usually flexed and rests against the abdomen. In persons with a well-developed abdomen, like the patient presented, the lower part of the forearm alone rests against the abdomen, and the weight of the unsupported elbow then tends to draw the lower fragment inward and downward, thus producing the deformity, notwithstanding the support of a well-made splint.

DR. BRYANT said that the cause of the deformity, however, is not always the same. In a case of supracondyloid fracture of the humerus which the speaker recently saw in consultation, the point of fracture was exactly the same as that in Dr. Stimson's case; but the angle of deformity was proven by the X-rays to be due to an inward displacement of the upper fragment. The case had been treated in the usual way, namely, by right-angled flexion of the forearm. Dr. Bryant said he did not recall whether the patient had a large abdomen or not.

DR. DAWBARN said that he had been very successful in preventing this deformity of the elbow since he had followed the method suggestion by Dr. Powers, of Denver, which was practically a combination of the two conflicting methods. During the first week he treated such fractures by extension and supination, thereby pulling down the inner condyle, and giving it time to become glued by fibrin in a normal position. At the end of the week, the forearm, most slowly and gently, is flexed into the usual right-angled position. Anæsthesia should be employed on both occasions.

The extension first used should be about five degree less than extreme, to avoid tilting the fragments.

Dr. Dawbarn said that in about four or five cases of "gun-stock deformity" in which he had resorted to this plan, the results were very much better than before.

DR. CHARLES N. DOWD inquired as to the treatment of this deformity after its occurrence. In a case which came under his care there was a marked deformity, which the speaker said he corrected by an osteotomy. The deformity was easily corrected, but it was difficult to hold the displaced fragment in position.

DR. L. W. HOTCHKISS asked Dr. Stimson whether he did not regard it as good practice in the treatment of supracondyloid fractures—especially in children—to put the elbow at once in a position of hyperflexion. This method had, as a rule, given very satisfactory results at Roosevelt Hospital Dispensary.

DR. STIMSON rejoined that he thought the results of the treatment of fractures in this region were generally good, deformities being exceptional. He had given the method, by full flexion, a thorough trial at the Hudson Street Hospital, and the results were in no respect better than those obtained by rectangular flexion, together with pronation of the upper part of the arm in such a way that the inner condyle is well forced down and kept there, preferably by a plaster splint. No one particular method will answer in every case, each must be treated according to the mechanical problems present. If the fracture is oblique from above downward and backward, full flexion is well adapted to prevent an anteroposterior angular displacement; if, on the other hand, the obliquity is from above downward and forward, full extension is preferable. He thought it ill advised to recommend any one method as superior in all cases, because it tended to lead practitioners to forget that a splint can only maintain the fragments in the position they occupy when it is applied. The point is to ensure reduction; then any splint may be used which immobilizes. His usual preference was for anterior and posterior moulded plaster splints, with the elbow at a right angle; in compound fractures he almost always used vertical suspension for the first week or ten days, because of its great value in diminishing reaction.

## PLASTIC REPAIR FOR MUTILATION OF THE NOSE AND MOUTH.

DR. JOSEPH D. BRYANT read a paper with the above title.

## SPINA BIFIDA.

DR. PERCY R. BOLTON presented a specimen of spina bifida, saying that it illustrated the anatomical identity of rhachischisis posterior and myelomeningocele. It also showed the disastrous consequences that must inevitably have followed any attempt at extirpation.

The child from whom the specimen was finally obtained was born at the Hudson Street Hospital, and died, when about ten weeks old, of enteritis. During its lifetime there was never any evidence of disturbance of the function of the cord or of paralysis of the branches of the lumbar or sacral plexuses. At birth the lumbar region presented a typical rhachischisis. The normal skin was deficient over an area one and a half inches by one inch. Crossing this area longitudinally was a whitish band about one-quarter inch in width, showing at each end as it passed beneath the skin a minute orifice readily admitting a probe and exuding cerebrospinal fluid. Laterally between the cord and the skin margins was a reddish tissue, the pia mater. There was at this time no elevation of this area above the level of the surrounding skin. Very soon, however, it was noticed that the cord and pia were being bulged out by fluid accumulating beneath them, which continued until at last a considerable sacculated tumor resulted. At the same time the area began to be encroached upon by the growth of epithelium from the margins of the skin, so that at the end of about seven weeks the cord and pia originally exposed were covered in, and the convexity of the cyst presented the appearance of a recently formed cicatrix of the skin. On removing the specimen, the bony defect was found to concern the laminae of the upper four lumbar vertebrae, whose other parts were normal. The clear (cerebrospinal) fluid furnishing the tumefaction was found between the dura in front and the pia and cord behind,—the position of the arachnoid has not yet been determined,—and through this space the nerves radiated to the intervertebral foramina.

*Stated Meeting, October 24, 1900.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

### LUMBAR HERNIA.

DR. WILLIAM B. COLEY presented a child, eleven months old, with a hernial protrusion about the size of a goose-egg in the left lumbar region. According to the statement of the child's parents, it had been noticed since birth, and was probably due to a congenital malformation of the abdominal parietes, allowing this mass to protrude through the triangular space between the latissimus dorsi and the posterior free border of the external oblique.

Dr. Coley said that under this class of so-called lumbar herniæ have been included various forms of rupture in which the protrusion occurs between the eleventh or twelfth rib and the crest of the ilium. The cases thus far on record are so few in number that they have not been accurately tabulated. Many of the so-called lumbar herniæ are traumatic in origin, and should not be properly classed as such.

The speaker said this was the second case of the kind he had seen. The first was in a child seventeen months old. The hernia was considerably smaller than in this case, and was operated on by Dr. William T. Bull about five years ago; and Dr. Whitman, who still has the case under his observation on account of a spinal curvature, reports that there has been no recurrence up to the present time. That patient was presented to the Society by Dr. Coley some years ago. The usual treatment in children consists of some sort of mechanical support, followed later by an operation, if advisable.

Dr. Coley said that lumbar hernia is three times as frequent in adults as in children.

### LONG IMMUNITY FROM RECURRENCE AFTER REMOVAL OF EPITHELIOMA OF THE LOWER LIP.

DR. CHARLES N. DOWD presented an old man upon whom he had operated for the removal of an epithelioma of the lower lip early in December, 1895, that is, almost five years ago. Up to the present date there have been absolutely no signs of a recurrence.



The patient was first presented at a meeting of the Surgical Section of the New York Academy of Medicine in December, 1896, and the operation was described in detail in the *New York Medical Record*, February 20, 1897.

A photograph of the case, taken previous to the operation, showed that the growth extended along the entire length of the lower lip. It also involved a large number of the submaxillary lymph nodes, some having attained the size of the end of a man's thumb. The operation done was a modification of Malgaigne's. It differed from Malgaigne's in that the lower incisions were carried beneath the body of the jaw, extending from the tip of the chin nearly back to the angle of the jaw. Through these incisions the submaxillary spaces can be thoroughly cleared out. The patient made an uneventful recovery, and the plastic effects of the operation were excellent. The diagnosis was confirmed by the pathologist.

DR. HOWARD LILIENTHAL said the result in Dr. Dowd's case was certainly remarkable, and in view of this he inquired whether the intervening tissues between the lip and the submaxillary spaces were also removed, and whether those tissues were at all infiltrated by the disease?

DR. DOWD replied that the tissues immediately adjacent to the growth were removed, perhaps to a distance of one-half or three-quarters of an inch. The tissues in the narrow strip between this point and the submaxillary spaces were not infiltrated and were not removed.

The growth in this case had existed for four years previous to the operation, and it was only during the last year that it had advanced rapidly. It belonged to the slowly progressing type of epithelioma, and in this variety the prognosis is more hopeful than in those cases where the growth is rapid.

DR. LILIENTHAL said that in Dr. Dowd's case the disease had evidently extended by glandular infiltration rather than by direct infiltration of the tissues between the growth and the submaxillary glands. The speaker said that the happy outcome of this case ought to render the surgeon more hopeful than many now feel in dealing with this class of malignant growths.

DR. F. KAMMERER said he thought the rule was generally accepted that in growths of this kind the lymphatics may be involved without any involvement of the tissues between the origi-

nal site of the disease and the glands. Operations are often done in accordance with that theory.

DR. CURTIS referred to the case of an old man with an epithelioma of the hand, and secondary involvement of the epitrochlear and axillary glands. The growth was removed, together with all the enlarged glands, and no recurrence had taken place three years after the operation. In that case it would have been impossible to remove the intermediary tissues except by amputation at the shoulder, and, although the general plan is to remove such tissues if we can, the compromise gave good results.

DR. LILIENTHAL said that to illustrate the point he had brought up he would call attention to the general rule of resorting to amputation for the radical extirpation of malignant disease in certain regions, the amputation to be done as far away from the disease as possible. All our work in amputation of the breast has been based on the assumption that the intervening tissue between the breast and axilla is diseased. Still, Dr. Lilienthal said, he admitted the criticism of Dr. Kammerer.

## AN EXOSTOSIS OF THE SHOULDER SIMULATING DISLOCATION.

DR. ELLSWORTH ELIOT, JR., presented a boy who was brought to the Presbyterian Hospital last June, with the history that on the previous day he had suffered from a trauma of the right shoulder which was so severe that it had rendered the boy incapable of using his arm. Following this injury a deformity of the shoulder was noticed: it was regarded as a dislocation, and a physician had made an unsuccessful attempt to reduce it.

When the boy was brought to the hospital he was unable to abduct the arm or make any movements of the shoulder-joint, and when these were carried out passively, they provoked a great deal of pain. Examination showed a large, round, hard mass on the inner side of the arm, extending from the level of the deltoid insertion below to a point opposite the anatomical neck of the humerus above. This mass was firmly fixed to the shaft of the bone; it was slightly lobulated: its surface was smooth, and the skin over it was freely movable. The deformity was ascribed to a fracture or dislocation (or both) of the shoulder-joint. A subsequent examination under an anæsthetic failed to show either a fracture or dislocation, and demonstrated that the deformity

was due to a new bony growth to which attention had been attracted for the first time by the accident. It had never been noticed by either the boy or his parents, and had given rise to no symptoms until the time of the accident.

An incision was made in a direction corresponding to the border of the pectoral major, and the growth was exposed and chiselled off. There was no definite line of demarcation between the growth and the humerus, of which it practically formed a part. On account of its size, it was supposed to be malignant, and in excising it a wide margin was given. At the conclusion of the operation, the compact bone forming the external surface of the shaft alone joined the head of the humerus to its lower extremity (below deltoid insertion). Drs. Thatcher and Tuttle, the pathologists of the hospital, reported that it seemed to be an osteoma: they were unable to detect any evidence of sarcoma.

Since the operation, there has been a new growth of bone to take the place of that portion of the humerus which was excised, and the motion of the limb is slightly limited at the shoulder only by the contraction of the cicatrix.

## FRACTURE OF THE HUMERUS WITH MARKED DISPLACEMENT.

DR. ELIOT presented a boy who, ten days previous to his admission to the hospital, had fallen, striking with great force upon his left shoulder. Examination at the end of ten days revealed a fracture of the upper extremity of the humerus just below the greater tuberosity, with displacement of the lower fragment forward, producing a marked deformity. Under an anæsthetic the slight adhesions which existed were broken up, and an attempt was made to reduce the deformity, but it was found impossible to bring the two fragments into apposition, notwithstanding the extreme traction employed. An incision was thereupon made along the anterior aspect of the bone, and upon exposing the fragments an overriding of three-quarters of an inch was noticed. After loosening the adhesions, another attempt was made by extension and counterextension to bring the fragments together, but in spite of the employment of a great deal of force it proved unsuccessful. Within two weeks the muscles had contracted to such a degree that the overriding of the fragments

could not be overcome by strong extension and counterextension. Therefore, three-quarters of an inch of the lower fragment was removed subperiosteally, and the two fragments were brought together with heavy chromic gut sutures. Primary union resulted, and the bone united very nicely. There is still a shortening of about half an inch.

DR. ROYAL WHITMAN called attention to the value of preliminary manual traction for the purpose of overcoming the resistance of the soft parts in cases like the one just reported by Dr. Eliot. This is also a valuable measure in the reduction of congenital displacements of the hip.

DR. ELIOT asked Dr. Whitman how long after the occurrence of such an injury should these manipulations be undertaken, and also how long they should be continued? In the case under discussion the accident occurred ten days previous to his admission to the hospital. On two occasions the boy was placed under an anæsthetic, and manual traction was employed for at least ten minutes; but, notwithstanding this preliminary manipulation, it was found impossible to reduce the fragments at the time of operation.

DR. WHITMAN replied that he thought it advisable to resort to manual traction as soon as the conditions indicated it, and continue it as long as might be necessary to reduce the deformity. He had in mind more particularly congenital displacements in which there is marked accommodation shortening of the tissues. The manual force should be intermittently applied, relaxing and pulling alternately for from ten minutes to half an hour. It should be done under the influence of an anæsthetic.

DR. ELIOT rejoined, saying that sometimes there seems to be a limit to the length of time during which this traction can be continued. He referred to a case of fracture of the femur which came under his observation last summer. There was very faulty union, and two inches of overriding at the end of the sixth week, although the fracture had previously been treated by extension. Traction of ten pounds and more was continued for two weeks longer without producing any change in the length of the limb, the slight amount of union having previously been broken up under ether. The fracture was then exposed, when it was found that the fragments were separated by muscular tissue. The fragments were enucleated from this muscle bed, the amount of venous

oozing necessitating the packing of the wound and the postponement of the reduction of the fragments until three days later, eight weeks after the original accident. An energetic attempt was now made to reduce the displacement, strong extension and counterextension being applied from above and below; and in addition to this traction was made upon the lower fragment by introducing a hook into the medullary cavity. By this method the deformity was finally reduced and the fragments were then sutured with silver wire.

This case, Dr. Eliot said, showed that even long continued preliminary traction is not always successful in accomplishing the reduction of a fracture, when overriding has taken place.

#### A PLASTIC OPERATION FOR THE RELIEF OF PHARYNGEAL OCCLUSION—MILTON'S OPER- ATION UPON THE ANTERIOR MEDI- ASTINUM.

DR. B. FARQUHAR CURTIS read a paper with the above title, and in connection with it presented two patients.

DR. KAMMERER said that in one instance he had removed part of the maubrium, the left clavicle, and first rib in order to ligate the first portion of the left subclavian for the relief of an aneurism. The artery was ligated about three-quarters of an inch from the aorta. The patient succumbed to hæmorrhage after four weeks. The specimen was subsequently shown at one of the meetings of the Surgical Society. In that case Milton's osteoplastic resection could not have, the speaker thought, been employed successfully, owing to the fact that the aneurism impinged on the clavicle and the bone had to be removed piecemeal. In such cases, where great care had to be taken to avoid lesions of the sac, atypical operations alone are possible, with removal of just so much of bone as is called for by the individual case.

In cases where the aneurism is attached to the posterior surface of the bone, it is very difficult to do an osteoplastic operation. For ligation of the innominate artery, however, which lies more superficially, the procedure is an excellent one.

DR. CURTIS said he agreed with Dr. Kammerer that the osteoplastic operation would be dangerous in cases where the sac of the aneurism was closely connected with the bone. In the case he had shown, however, the principal portion of the tumor involved

the second portion of the subclavian, although there was aneurismal dilatation of the first portion of that artery and of the carotid. The axillary artery was also dilated, and the opposite axillary artery is still about the size of a man's thumb. In fact, the patient is suffering from a general dilatation of the vessels.

Dr. Curtis said he thought that Milton's operation would be found equally satisfactory in ligating the left subclavian.

# TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

*Stated Meeting, March 5, 1900.*

The President, WILLIAM W. KEEN, M.D., in the Chair.

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## TUBERCULOSIS OF THE CARPUS—EXCISION.

DR. ROBERT G. LE CONTE presented a man, twenty-two years of age, who, after a sprain of the wrist sustained six years ago, developed tubercular disease of the carpus. For two years a discharging sinus had been present. A radiograph (Fig. 1) shows the disease to have involved not only the carpus, but the adjacent portions of the radius and ulna and of the fourth and fifth metacarpal bones.

The reporter said that in 1891 Professor Stutgart, of Copenhagen, exhibited a resection of the tarsus, in which he had split the foot between the metatarsal bones, in order to thoroughly expose the tarsal bones. At the same time he suggested that the wrist-joint might be well exposed by splitting the hand completely between the metacarpal bones. This suggestion was taken up by Mynter in 1894. Stutgart advised the complete splitting of the palmar and dorsal surfaces of the hand, cutting between the metacarpal bones down to the carpus. Mynter modified this by splitting the palmar surface only to the metacarpophalangeal joint, and then splitting the whole of the dorsal surface down to the radius. He advocated going between the second and third metacarpal bones.

Dr. William J. Taylor, in doing the operation this fall, still further modified it by limiting the incision to the dorsum of the hand, and opening between the third and fourth metacarpal bones. The incision extended a little beyond the metacarpophalangeal articulation down to the radius. Dr. Le Conte followed Dr.



FIG. 1.—Tuberculosis of the carpus.





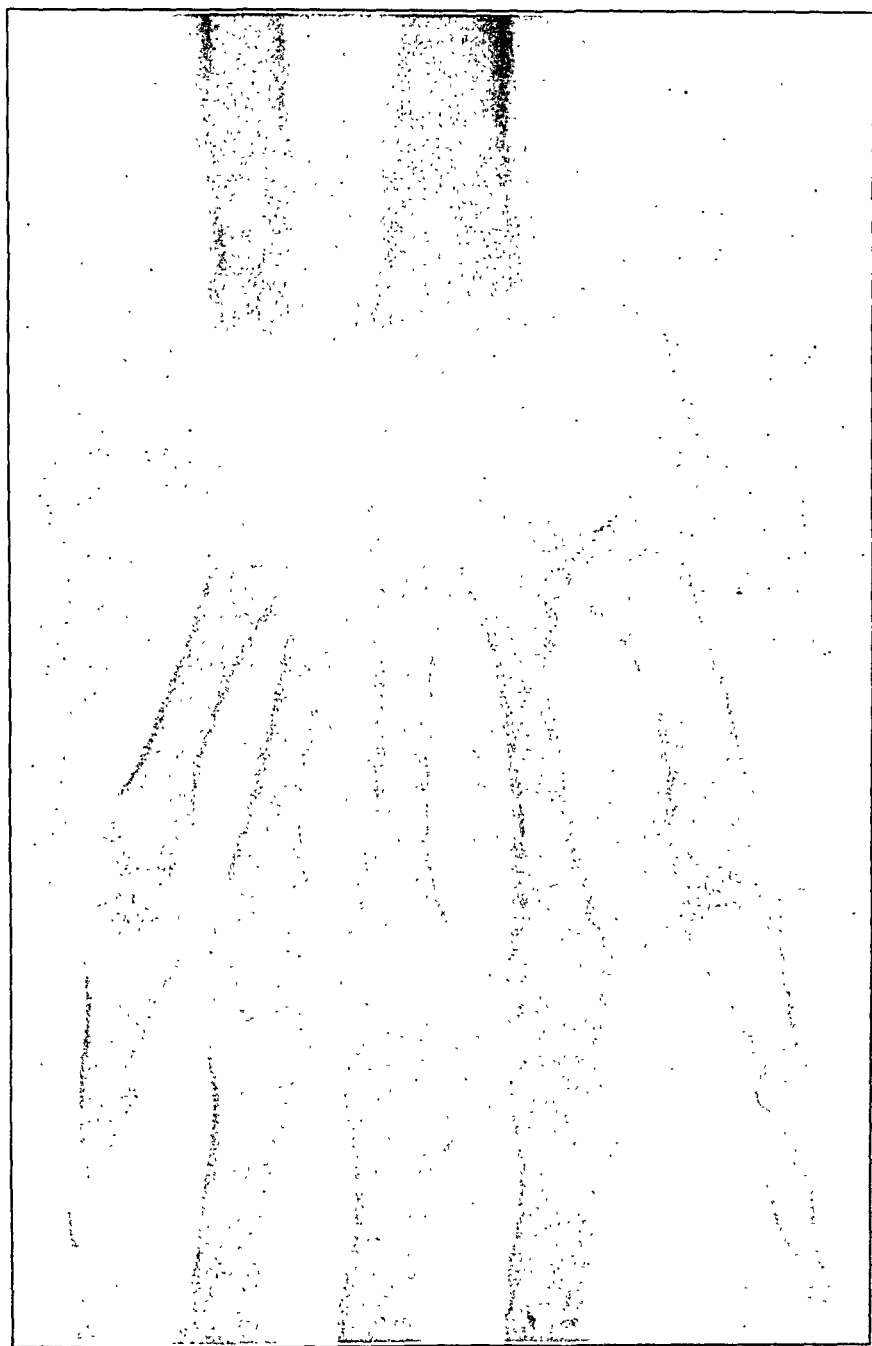


FIG. 2.—Tuberculosis of the carpus.



Taylor in doing this excision. After the dorsal incision on the hand is made, the dorsal and palmar ligaments holding the third and fourth metacarpal bones together are divided and the two bones forcibly separated from each other. With a knife the carpus is now disarticulated from the metacarpus, and by pulling the hand down, the carpus is forcibly dislocated backward. The palmar surface of the carpus is then freed from the soft parts by dissection until healthy bone is encountered in the radius and ulna. After reaching the limit of the disease, the radius and ulna are divided with a saw or forceps. This removes the whole carpus and the radio-ulnar articulation in one piece. If the disease has extended to the metacarpal bones, they are individually resected. All tubercular material is now dissected away from the tendon sheaths and the adjacent soft parts. The incision is then closed and the resulting cavity loosely packed with iodoform gauze. The advantages of this operation over the older methods of excision seem to be these: that one can treat the carpus as one bone instead of picking it out piecemeal, that there is little danger of cutting tendons except those attached to the carpus, and that the exposure of the parts is so free that all tubercular material is easily dissected away from the surrounding soft parts, leaving a clean wound which heals promptly.

DR. W. J. TAYLOR remarked that the advantage of the method of operation illustrated in Dr. Le Conte's case is that it gives greater facility, greater ability to get at and remove all the diseased tissue. By this incision one can absolutely turn out the bones from the joint; one can expose every nook and cranny and can cut out with the scissors every particle of tubercular disease. Then, too, a saw can be used to cut the ends of the radius and ulna, and exposure of the joint and of all the surfaces is made quite as well as in the ordinary excision of the knee. The patient he showed to the Academy in January, upon whom he had operated, has developed a general tuberculosis now. His other wrist is involved, his shoulder is involved, he has had a large tubercular abscess in his chest, and his lungs are very much involved in the disease. Although this has not been a favorable case for the ultimate good results, yet the very large dead space between the ends of the shortened metacarpal bones and the radius and ulna has steadily diminished. When seen a few weeks ago, he had very much less motion in the wrist than when he was here, show-

ing that the fibrous tissue was filling up and the dead space was contracting.

## CARCINOMATOUS DEGENERATION OF UTERINE MYOMA.

DR. ROBERT G. LE CONTE presented a specimen of large intraligamentous fibromyoma of the uterus with endometrial carcinoma of the fundus. The specimen had been removed from a woman, aged thirty-six years, who was admitted to the Pennsylvania Hospital January 20, 1900, well nourished, but very anæmic from profuse bleeding from the uterus. A blood count showed red cells, 2,000,000; white, 7400; marked poikilocytosis, hæmoglobin, 18 per cent. A large, smooth, firm, movable tumor extended from the pelvis to two inches above the umbilicus. Vaginal examination revealed a normal cervix with a virgin os, which was continuous with the tumor above. The patient was placed at absolute rest, with the most nourishing of diet, ferruginous pills, and 1/100 of a grain of atropia sulphate three times a day. At the end of a week the bleeding had practically ceased. February 28, hæmoglobin had reached 57 per cent.; March 2, the tumor was removed. It was almost entirely covered by a greatly hypertrophied broad ligament. It filled the whole of the pelvis, making it impossible to reach the vessels until the broad ligament had been completely split across. The uterus was amputated at the internal os, the stump closed, and the broad ligaments whipped together with catgut. Dr. Cattell, pathologist to the hospital, reports as follows:

The specimen can best be described as composed of two parts, the one a large myofibroma, the other the uterus, with cancerous degeneration of the fundus extending down within three-quarters of an inch of the cut portion. The weight of the mass is four pounds fourteen ounces, the length eight inches, and the width seven and one-half inches. Microscopically, the cancer is of the glandular variety, the acini are long and tortuous, and in places well filled with epithelial cells arranged in layers.

At the time of operation there was nothing to suggest cancer, or a complete hysterectomy would have been done. The point of interest now is whether the stump of the cervix should be removed, or whether an amputation three-quarters of an inch away from diseased endometrium is a sufficient safeguard to the

patient. Of all the situations in the body, carcinoma of the fundus uteri is by far the most favorable, and operation has been followed by the largest proportion of cures. Dr. C. B. Penrose recently told the reporter that he had three times amputated the uterus at the internal os for causes other than cancer, and that an examination of the specimens later revealed carcinoma of the fundal endometrium. In each case he had gone beyond the disease for half or three-quarters of an inch, and none of the patients would consent to a second operation. The last patient was operated on four years ago, and all are living and well, and free from a return of the disease.

DR. BEYEA said that he remembered very well the three cases operated upon by Dr. Penrose, referred to by Dr. Le Conte, having himself made the microscopical studies of the growths. In all three the malignant disease was in a very early stage of development; in fact, there was some question of doubt as to the actual presence of such a change. The endometrium showed the microscopical changes characteristic of the diffuse hyperplastic or fungoid endometritis described by Olshausen, but in the deeper portion of the endometrium the glandular proliferation was so great that it seemed to be breaking through into the stroma tissue. They were cases of hyperplastic endometritis in which there was a strong suspicion of beginning malignant adenomatous change. There was no positive diagnosis of malignant adenoma. They were not adenocarcinoma or medullary carcinoma. For these reasons they can scarcely be of value in considering the danger of leaving the cervix behind when there is carcinoma of the body of the uterus. Carcinomas of the body of the uterus, however, rarely infiltrate into the cervical tissue, but, beginning in the corporeal endometrium, infiltrate and destroy the muscle wall of the body, and finally break through the peritoneum. In one instance he had observed the muscle tissue of the body quite completely destroyed by the carcinomatous disease, which formed nodules beneath the peritoneum and distorted the shape of the uterus. Even here the cervical tissue was normal. The patient has now been free from recurrence five years. He would say from his experience and microscopical studies of these cases that it is quite improbable that there will be a return in Dr. Le Conte's case. The association of carcinoma with myofibroma of the uterus has not

infrequently been reported. He had observed three such cases. Last year he had under his care a woman who had a carcinoma of the cervix with a large multinodular fibroid of the fundus. The case was an inoperable one; the infiltration extending into the broad ligaments. Another case was that of a woman operated upon some four or five years ago. There was an interstitial fibroid nodule the size of a baseball at the fundus, and an advanced malignant adenomatous disease arising in the endometrium and destroying the muscle wall of the uterus. Here, too, the cervix was normal. It was the only typical case he had seen of that form of malignant disease which Ziegler described as adenoma destruens. The gland spaces were irregular, one breaking through into another, and they were lined with a single layer of cylindrical epithelium. Nowhere did the cells fill up a gland space or present the change characteristic of adenocarcinoma. He believed this to be an extremely rare form of carcinoma of the uterus.

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*Stated Meeting, April 2, 1900.*

The President, WILLIAM W. KEEN, M.D., in the Chair.

### PYOPNEUMOTHORAX WITH GREENSTICK FRACTURE OF THE RIBS.

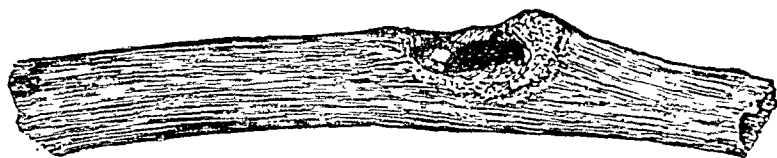
DR. FRANCIS F. STEWART related the following case, occurring in Dr. Hopkins's service at the Pennsylvania Hospital, of incomplete fracture of the fifth and sixth ribs, complicated by pneumothorax, and terminating in death from croupous pneumonia of the opposite side ninety days after the original injury.

A boy, aged six years, was admitted to the hospital immediately after having been struck by the wheel of a coal-cart. The surface was cold and sweaty, the temperature being 97° F., the pupils dilated, the pulse weak and rapid, 144 to the minute, and the respiration 30 and jerky. Great pain and tenderness were complained of all over the left chest, which did not respond to inspiratory efforts. Fracture of the ribs could not be demonstrated. There was neither spitting of blood nor emphysema. The chest was immobilized with adhesive plaster, stimulants

administered, and external heat applied. The temperature subsequently rose and fluctuated between  $102^{\circ}$  and  $104^{\circ}$  for thirty-three days, when it reached the normal point. The pulse undulated with the temperature. The respirations were embarrassed and averaged 40 to the minute until the chest was opened, when they subsided to the normal. The urine contained a trace of albumen and a few granular casts.

At the end of twenty-four hours the whole left chest was distended with air, the cardiac apex being displaced to the fifth right interspace. Dyspnoea with a short, unproductive cough was noted.

On the fifth day, the conditions not having improved, about four quarts of air and four and one-half ounces of bloody serum were aspirated from the seventh interspace, midaxillary line.



Incomplete fracture of rib.

Considerable emphysema of the chest wall followed the withdrawal of the needle. This persisted for three days.

On the twelfth day a pneumonia of the right apex developed.

The improvement following the primary aspiration was of short duration, the distention returning and increasing until the thirty-first day, when the heart pulsations could be felt at a point two inches to the right of the sternum. The chest was again aspirated, a large quantity of air with a few drachms of pus being withdrawn.

On the thirty-third day, the signs and symptoms persisting, a rubber tube was introduced through an incision in the sixth interspace, postaxillary line, and about eight ounces of pus and much air evacuated. The temperature immediately fell to normal, the respirations became quiet, and the boy grew progressively better until the seventy-sixth day, when he was discharged, the wound having closed, the heart returned to the normal site, and the pulmonary resonance and breath sounds having approximated the normal.

Nine days later he was re-admitted with a fully developed



croupous pneumonia of the lower right lobe. He died four days later, on the fifth day of the pneumonic process, and ninety days after the original injury.

The post-mortem disclosed a red hepatization of the lower right lung. The left lung was collapsed, about one-fourth the size of the right lung, and lay in the upper part of the thorax close to the vertebral column. It was dark in color and almost airless, the splenization of the pathologists. The remaining portion of the pleural cavity was filled with air contained in large balloon-like sacs made of lymph. The fifth and sixth ribs were firmly glued together by soft callus and were identical in appearance, in each the internal bony cortex had given way in the postaxillary line. The fifth rib was resected for closer examination. Nothing worthy of note was discovered in the other organs.

The rarity of partial fractures of the ribs, especially in children, is questioned by many authors, but few have had the opportunity to demonstrate it by autopsy. The "International Encyclopædia of Surgery" mentions a child who, dying of ruptured lung, was found to have sustained a greenstick fracture of two or three ribs on each side. Rib fracture is uncommon in childhood owing to the great elasticity of the thoracic cage, but when it does occur, one would think the conditions ideal for an incomplete fracture. The diagnosis would be almost impossible to make, crepitus, deformity, and preternatural mobility being absent. Costal fracture was believed to have occurred in this case, but its situation could not be localized, although each rib was carefully palpated and an X-ray plate made. The specimen shows the break filled by soft callus, the lower edge and the lower half of the internal plate having yielded as a result of the direct force of the impinging cart-wheel.

Pneumothorax must be a very infrequent complication of fractured ribs even when the lung is punctured. This is the only case in 175 of which we have knowledge. West has proven experimentally that there is a strong coherence between the pleural laminæ, not accounted for by the elasticity of the lung, and which is adequate to hold them in contact even though the pleural sac be opened. The lung is also often held to the chest wall by adhesions. Panas asserts that 25 per cent. of all adults have pleural adhesions.

The mechanism of the production of the pneumothorax is

not quite clear. Puncture of the lung by the ribs would have probably caused an external emphysema, unless the intercostal structures remained intact. It is not inconceivable that it should have been due to a rupture of the air-vesicles, the result of a sudden severe blow dealt the chest when the lung was hyper-distended, as at the end of a deep inspiration preparatory to a cry of fright. Osler mentions a case which followed heavy lifting.

Air may enter the pleural sac through the chest wall or from a tracheotomy wound, causing a mediastinal emphysema and ultimately a pneumothorax. Money has observed two such cases in twenty-three tracheotomies, and lays down the rule that the deep fascia should never be raised from the windpipe. It may come from the colon, stomach, or œsophagus, as a result of suppurative or malignant disease. It may be produced by ærogenetic micro-organisms in a suppurative pleurisy. And it may emanate from the lung either from intrinsic disease or from external disease or trauma. Ninety per cent. of all the cases are due to phthisis.

Concerning the diagnosis, the Röntgen ray will contribute, in doubtful cases, to reaching a conclusion, an intense clearness being produced over the air-sac.

The treatment should be the same in all cases, be the cause what it may. So long as respiration is unimpeded, operative interference may be ignored; indeed, a little pneumothorax may be a good thing, giving rest to the affected lung; but if breathing be difficult and the organs displaced, an external opening must be made. Rose reports striking improvement in eight cases of phthisis in which rib resection was practised. He holds that mere aspiration is of little value.

The pneumothorax in this case was severe, was unrelieved by repeated aspiration, and was finally overcome by the introduction of a tube into the chest. The subsequent history would seem to indicate that a free opening at first would have relieved the pressure symptoms permanently, even though it did not permit the expansion of the collapsed lung, which might have been accomplished by respiratory exercises and mechanical means later, when the lung wound had closed. It would be a nice point in surgical judgment to determine just how soon measures for the re-expansion of the lung should be inaugurated. If adopted too early the rent in the lung would be sundered, and the very

condition one sought to alleviate would be aggravated. If employed too late, the efforts would be futile, the lung being bound by firm adhesions, the vesicular walls coalesced, and new connective tissue permeating in every direction.

In case of stab wound of the chest, Dr. Hopkins resorted to an ingenious plan of expanding the lung and preventing the further entrance of air into the thorax. A small rubber tube was introduced into the pleural sac, the wound snugly sutured about it, and the joint made air-tight by rubber tissue and collodion. The air was then slowly exhausted and the tube occluded. In this case there was no leakage from the lung. In a persistent pulmonary leak, however, each expiration lends a puff of air to the general distention, so that an external vent must be established and maintained, unless the lung wound be large and accessible, when it may be sutured, otherwise it must be left to itself, be hæmorrhage not imperative.

Once the pneumonic wound has healed, a total exclusion of the entrance of air through the operative wound should favor a more satisfactory result. Dr. Hopkins has suggested and used in a case of pyopneumothorax a glass tube containing in its outer end a puppet-valve which allows air and pus to escape during cough and deep inspiration, but precludes the entrance of any air from the exterior. The siphon apparatus, invented by a Buffalo dentist and described by Keen, might be employed in these cases if the joint between the skin and the tube be made air-tight. The principle is the same as that of the mercury pump.

The Fell O'Dwyer apparatus for artificial respiration has been suggested to anticipate and combat acute operative pneumothorax. It consists of an intubation set with attached bellows.

DR. HARTE said that he was inclined to think that greenstick fracture of the rib is of much more common occurrence, particularly in children, than is generally considered. He had seen cases where the side had been crushed in and had had an opportunity to examine the patients post-mortem where this condition of affairs was evident. He believed that many injuries to the ribs in children are of the greenstick variety. Yet all recognize how difficult it is to make a positive diagnosis in these cases, owing to the anatomical difficulties which exist and the surrounding of the injured rib by one above and below it, which naturally act as splints or supports; consequently, crepitus and preter-

natural mobility are impossible to determine. Fortunately, the treatment in all instances is the same, and as a rule the results are most satisfactory.

With regard to the pneumothorax very little has been written, and then the subject is usually dismissed by writers in a very few lines. On the other hand, he thought that pneumothorax is not a very serious condition. Air in the thorax at any time, as a rule, will soon disappear. This condition occurs very frequently in fracture of the ribs, and rarely gives a surgeon any concern. Many mechanical devices for the relief of pneumothorax he considered as nothing more than surgical toys and of no practical advantage. Exhausting the air from the pleural cavity will not facilitate the closure of the wound in the pulmonary pleura. On the other hand, it really makes the conditions more favorable for the escape of air from the lung into the pleura, by reducing the air-pressure in the pleura and allowing the escape of air from the lung into the partial vacuum in the pleura, tending to keep up a constant flow of air at all times from the lung into the pleura. The experience of surgeons in empyemas, where a large opening has been made into the pleural cavity, has been usually most favorable, and the presence of air in the pleural cavity does not in any way militate against the lung's expanding. In cases where there is evidence of intrapleural pressure, he would advise opening the chest wall and treating it as though it were a case of empyema.

DR. LE CONTE said that he saw this case probably at its worst. The pressure from the pneumothorax was sufficient to push the heart over to the right side, so that the apex beat was almost in the region of the right nipple. When such a condition exists as a result of fluid in the pleural cavity, no one would hesitate to open the pleura and insert a drainage tube or resect a portion of rib. It is not the fluid but the pressure from the fluid that causes the alarming symptoms. If, therefore, air in the pleural sac causes alarming pressure symptoms, why should one not apply the same rule, *i.e.*, relieve the pressure and allow the lung to collapse by opening the pleura. As a result of the pneumothorax this child later developed a pyothorax, and it necessitated opening the pleura with drainage, and the moment the pleura was opened the child began to improve.

## ACUTE CHOLECYSTITIS COMPLICATING TYPHOID FEVER.

DR. THOMAS R. NEILSON reported the case of a man, aged forty-two years, who, on the evening of May 14, the fifty-eighth day after admission with typhoid fever which had pursued a mild course, but had relapsed, and was then apparently proceeding to convalescence, complained of a sharp pain, which he located in the epigastric region, and which, he said, followed immediately after he had reached to a small table, close by the right side of his bed, for a glass of water. At the time when he complained first of this pain, the temperature was  $99\frac{1}{5}^{\circ}$  F., the pulse 82, the respiration 20. The bowels had been freely moved that day, and the tongue was clean. The pain was considerably relieved by simple measures (soda mint, etc.). The next day, however, the pain was still present, although not severe, being referred to the same region, and there was no change in the pulse or temperature. By the morning of the following day the pain was somewhat more marked, the temperature was  $100^{\circ}$ , the pulse 96, respiration 24. Examination of the abdomen again failed to elicit any marked tenderness in any part of it. Through the day the pain continued, tending to be paroxysmal, and being referred, but quite indefinitely, to the right hypochondriac region, although the patient also complained of it at times in the lower portion of the abdomen. The evening temperature was  $99\frac{1}{5}^{\circ}$ , the pulse-rate had increased to 104, and the respiration was the same as in the morning.

The next morning, May 17, the patient vomited what was evidently bile; the temperature rose to  $102\frac{3}{5}^{\circ}$ , the pulse to 120, and the respiration to 28. The abdomen was slightly tympanitic, pain in the region before described persisted, and was intense at times, and on palpation he found some tenderness close to the costal border, in the region of the gall-bladder. There was nausea at intervals, and eructations, and considerable flatus passed by the bowel. The condition of the patient grew worse through the day, his temperature in the afternoon rising to  $103\frac{4}{5}^{\circ}$ , and the pulse to 130, with poor volume. Pain was more severe and vomiting again occurred in the evening. The general condition was far from promising; nausea was unrelieved by treatment, and, besides that, hiccough was added to the already distressing state.

Early the following morning a chill occurred, and after that

there was vomiting again. The temperature was then  $103^{\circ}$ , and by eight o'clock it was  $104^{\circ}$ . Examination of the abdomen revealed its condition to be as on the day previous,—slight distention, some tenderness in the region of the gall-bladder, but not of a marked degree. There was, in addition, some muscular rigidity in the right upper quadrant, and some elastic resistance near the costal margin at the ninth and tenth ribs could be detected. There was hyperleucocytosis, the count being 12,350. The patient was in a condition of extreme anxiety and depression, and although the outlook was not promising,—the temperature at noon being  $103\frac{2}{5}^{\circ}$  and the pulse 136,—operation was advised and agreed to. Immediately, as soon as the necessary preparations could be made, the abdomen was opened.

On opening the peritoneum, the gall-bladder, the surface of which was dark-red and dull in appearance, presented in the wound. It was distended, and on breaking away numerous light and recent adhesions which had formed between it and the surrounding viscera—especially the transverse colon—it was found to be markedly lengthened upward and inward. When the gall-bladder was incised, there first flowed out a thin, watery mucus, then bile and mucus, and last of all a fluid more viscid and unmistakably pus. The walls of the gall-bladder were thickened, soft, and friable, and were deeply congested, bleeding easily when punctured and incised.

Evacuation having been accomplished, fresh iodoform gauze was substituted for that first packed around the gall-bladder, a rubber drainage tube inserted into the latter, and the margins of the opening made in the fundus were secured by silk stitches to the parietal peritoneum at the upper angle of the wound, which latter was, for the remainder of its extent, closed with silkworm-gut sutures. A copious dressing of sterile gauze was applied.

The patient bore the operation well, and was none the worse for the ether, which was most carefully given. There was little, if any, shock. The temperature fell to  $100\frac{3}{5}^{\circ}$  F., and three hours later to  $99\frac{3}{5}^{\circ}$ , accompanied, however, by a fall in the pulse-rate from 138 to 124. By six in the evening the temperature rose again, reaching  $102\frac{3}{5}^{\circ}$ , but after that it slowly fell, remaining for the greater part of the next forty-eight hours between  $99^{\circ}$  to  $100^{\circ}$ , the respiration ranging from 20 to 26, and the pulse from 122 to 140.

The patient experienced but little relief from the operation, —none besides freedom from the severe pain which he previously had. Hiccough and nausea, particularly the former, were most obstinate and became very distressing. The abdomen was not tender, save, of course, in the region of the wound, nor was it markedly distended; but the accumulation of gas in the intestines was an annoying feature. The bowels were moved with difficulty by means of calomel and enemata.

The patient got but little rest on account of the persistent hiccough, which yielded but for short intervals to varying medication. Vomiting occurred several times, but the patient was able, for a considerable number of hours, to take small amounts of liquid nourishment. Rectal alimentation was, of course, resorted to in addition. From the wound there was a free discharge of bile, requiring many gauze pads to absorb it, besides the gentle changing of the dressing.

On the afternoon of May 20, the beginning of the third day after the operation, the patient vomited freely, and his condition became emphatically worse. Tympanitis increased, hiccough became more violent and constant, nausea more persistent, the temperature rose to  $100\frac{3}{5}^{\circ}$  F., the pulse grew weaker, although no more frequent, and a low delirium developed. In short, the picture of septic peritonitis was complete. Death occurred at 4.30 on the following morning.

DR. GIBBON remarked that about a year ago he operated for empyema of the gall-bladder following typhoid fever. It was a young girl who had been in the wards of the Pennsylvania Hospital, suffering from a typical attack of typhoid fever. She had been at home for about ten days when she returned to the hospital, saying that she had been taken sick with a pain under her right costal border, and her mother the day before discovered a tumor in this position. She had some fever. The tumor was very easily outlined in the gall-bladder region, and there was very little rigidity of the abdominal muscles at the time. There was no general distention, but the symptoms were acute; the woman had fever, and the operation seemed to be urgent. When the abdomen was opened the gall-bladder came into view very much distended, and there was at first a copious discharge of mucus and then pus. This girl got well without any trouble. The sinus closed entirely. He looked up her history in the medical

ward afterwards and found that several times during her typhoid fever she complained of pain in the region of the gall-bladder. Once or twice at night she was given morphine for this pain. Each time it went away, and the pain complained of on readmission was, the patient said, in the position and of the same character as that which she had when ill with typhoid fever.

DR. HARTE remarked that as a rule the operation for cholecystitis immediately following typhoid fever is not a favorable operation, as the patient's condition necessarily is always very much below par. He had had an opportunity to operate on two cases of cholecystitis following typhoid fever, but in both of these instances the patient had quite thoroughly recovered from the typhoidal attack, and consequently was well able to withstand the result of the surgical operation. Both of these cases did perfectly well and made very satisfactory recoveries. Attention had been called to the fact that the first fluid to escape from the gall-bladder of Dr. Neilson's case was serous in nature. His experience is that that is nearly always the case in these conditions. The first fluid is usually serous in character, then sometimes serum stained with bile, and then, lastly, the pus is usually found down at the bottom of the gall-bladder, often accompanied with masses of calculi which it surrounds. This condition of affairs, of course, is entirely dependent on the effect of gravitation, and of course the relative positions will be influenced by the position the patient has assumed prior to the operation.

### NEPHROLITHIASIS.

DR. JOHN B. DEAYER reported the case of a man, thirty-three years of age, who for two and a half years had complained of an aching pain in the back, which increased on motion, but was relieved by rest. The pain radiated from the anterior superior spine of the ilium, through the groin to the left testicle and across the back. The pain was intense at times. No tenderness over the region of the left kidney. Micturition was unattended by burning or pain except when a catheter was used. There was a time when the patient was compelled to rise two or more times at night to evacuate his bladder. When constipated, or when tympanitic distention existed, the pain was exaggerated. He never suffered from nausea or vomiting during the acute exacerbations. An X-ray taken a week before admission to the hospital revealed the



presence of a stone in the left kidney, also a second shadow about which there was some doubt. July 19, 1899, a vertical incision about three inches long was made in the left loin over the kidney and the organ exposed. A stone was felt in pelvis of the kidney, a cyst containing blood was discovered in the upper part of the organ. The pelvis was incised and the stone removed. The cyst was evacuated, the two incisions closed with silk sutures. The wound was packed and allowed to heal by granulation. Cure resulted.

### MOVABLE KIDNEY AND HYDRONEPHROSIS.

DR. DEEVER also reported the case of a woman, aged twenty-one years, who was first attacked with dull aching pain in the left loin in November, 1896, since which time she has had numerous attacks of this pain, at times associated with nausea and vomiting. Immediately following the attacks of pain blood would appear in the urine, but an X-ray examination was negative. December 14, 1899, a vertical incision, three inches long, was made in the loin over the left kidney. The perirenal fat was dissected away and the kidney exposed. On examination, the pelvis of the ureter and the first part of the ureter were found to be dilated to the size of a small lemon. There was no stone present. The dilated portion of the pelvis and of the ureter was incised in the long axis of the ureter and clear fluid evacuated. The surplus portion of ureter was cut away and the wound sutured. The kidney was explored for stone, but none found. The surface of the kidney was scarified and the organ anchored in the wound with gauze. The patient made a satisfactory recovery.

A second case of movable kidney was in the person of a man, aged twenty-four years, who, after convalescing from an operation for chronic appendicitis, returned to the hospital to obtain relief from pain in the left renal region from which he had suffered intermittently for several years. The patient can only recall the pain, and say that it was excruciating, and that it did not extend into the penis or along the course of the ureter.

The second severe attack of pain, referred to left renal region, occurred while the patient was convalescing from his operation for appendicitis, and had the characteristics of kidney colic; the pain was referred down the course of the ureter and into the testicle of the corresponding side. This attack was not accom-

panied by nausea or vomiting, nor was the urinary examination attended by any positive results. The pain persisted, and shortly after the onset urination was attended by pain. Urinary examination, also X-ray examination negative. A vertical incision of three inches was made in the loin, commencing at the border of the twelfth rib at the postaxillary line, on the left side, the perirenal fat was broken through, when it was discovered that the kidney held a lower plane than normal. The kidney was brought into the wound and explored with a negative result. The kidney was anchored in the wound with gauze. The wound was packed with sterile gauze after the method of treating movable kidney. Recovery followed.

### NEPHRECTOMY FOR HYDRONEPHROSIS.

DR. DEEVER further reported the case of a man, thirty-eight years of age, who from early boyhood had suffered from paroxysmal attacks of pain in the right side, referred along the right ureter. During these attacks had a desire to urinate immediately, the pain ceasing at the end of micturition. When surrounding circumstances prevented micturition, he would strike his right side sharply; this relieved the pain to some extent. These attacks would take place either several times a day, or at intervals of one or two months. The quantity of urine passed varied from one-half ounce to twenty ounces.

This condition continued until four years ago, when he noticed a swelling in the right loin of about the size of an apple, accompanied by a sharp pain. In three or four days the tumor partially disappeared. Then for several years the tumor slowly increased in size until again about the size when first noticed. One year ago he had an attack of jaundice lasting three or four months, and since this time the tumor has been growing rapidly until it occupies the right hypochondriac, the right lumbar, the right iliac, and the umbilical regions.

The urine was frequently examined and always pronounced normal. His appetite is always good; he has not lost weight.

A blood examination showed hæmoglobin, 65 per cent.; red corpuscles, 4,500,000; leucocytes, 4,000,000; so it was practically normal blood. Believing the kidney to be in the condition of a hydronephrosis, an operation was done by the extraperitoneal route. This operation was particularly easy, from the fact that

it was a large cystic organ. The cyst was exposed and aspirated; that reduced it. There was one common cyst, consequently there was no trouble in evacuating, after which the remaining part of the operation was very simple. It was terminated by suturing the wound and anchoring the ureter, after tying the distal end. This patient has recovered without a bad symptom.

The specimen consists of a mass of tissue, kidney shaped, fifteen by six centimetres in size, which is attached to the walls of an apparent cyst. The walls of the cyst are about five millimetres thick and are in direct contact with the remains of the kidney proper.

The interior of the kidney is in direct communication with the cyst cavity and forms part of the side of the cyst. The interior of the kidney has practically disappeared, and the stroma has changed so as to form several incomplete compartments, all in contact with main cyst cavity and opening into it.

The walls of the kidney proper are ten millimetres thick.

### MALPOSITION OF KIDNEY.

DR. JOHN H. GIBBON spoke of a case of malposition of the kidney which he had recently seen in the dissecting-room. The organ, which was of normal size, was more or less firmly attached in the left iliac fossa, receiving its blood supply by a very short vessel from the external iliac, and having a correspondingly short ureter. The fact that the kidney was fixed in this position, together with the length of the renal artery and the ureter, shows that the kidney had always occupied the iliac fossa; this anomaly suggests the necessity of always palpating the kidney before making an incision to reach it. One can readily imagine the varied complications of diagnosis which a diseased kidney so placed might give rise to, and such complications would be greatly increased if the right kidney should be so anomalously situated.

# TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY.

*Stated Meeting, October 4, 1900.*

The President, JOHN E. OWENS, M.D., in the Chair.

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## THE MECHANICS OF HIP DISLOCATIONS.

DR. OSCAR H. ALLIS, of Philadelphia, by invitation, made demonstrations upon the cadaver of the various forms of dislocation of the hip.

DR. ARTHUR DEAN BEVAN said that the subject of hip-joint dislocations had been, from the time of Hippocrates, a problem to surgeons, and he thought it could be truly said that it was left to the nineteenth century and to American surgeons to furnish a satisfactory answer to this problem. The names of Nathan Smith, of Reid, of Moses Gunn, of Bigelow, and of Allis, would always remain inseparably connected with the problem of hip-joint dislocations and their reduction by manipulation. The present demonstration was held in a most appropriate place, for it was Moses Gunn's surgical amphitheatre. It was here that that teacher repeated many times the rule which had been of great benefit to Western surgeons and to the many patients whose dislocations they had cared for. As a student he could vividly remember Dr. Gunn standing in this amphitheatre, white-haired, full of fire and energy, giving his famous rule which is known very widely as Gunn's rule, namely, in reducing a dislocation we must "place the limb in the position which it occupied at the moment of escape, and reverse the force."

Gunn taught, in regard to dislocations of the hip, that the untorn portion of the capsule was an important factor, and the most important which prevented easy reduction; and that in order to reduce a dislocated hip it was necessary to relax the untorn portion of the capsule, and this was best done by placing

the limb in the position that it occupied at the moment of escape, and then, by reversing the force, the reduction was accomplished.

Dr. Allis had beautifully and clearly illustrated this point. What could be a more perfect illustration of the truth of this rule than the first dislocation which Professor Allis had made? He made a dislocation absolutely by driving the head of the femur through the posterior portion of the capsule, and effected the reduction of the dislocation by placing the limb in exactly the same position it had occupied at the moment of escape and reversed the force.

The development of our scientific knowledge of dislocations of the hip, as Hamilton notes in his classical work on "Dislocations and Fractures," should be credited to Reid, because, until the time of Reid's paper in 1851, although many dislocations had been reduced by manipulation before that time, the cases were extremely rare in proportion to the number of dislocations that occurred, and their reduction by the crude and cruel compound pulley was the rule, and was still in favor with surgeons. From the time of Reid, reduction by manipulation became the favorite method. The work of Gunn in 1853 was a distinct advance on that of Reid, and was generally acknowledged as such. Hamilton extensively quoted Gunn's work. Bigelow's work was a still further advance, his monograph having been contributed in 1867. And now surgeons had the work of Allis, which the speaker believed would live in history as a monograph, published in 1895 as the Gross Prize Essay, which seemed to complete the work laid down by Reid, Gunn, and Bigelow.

It would appear as though, from an experimental study on the cadaver, Dr. Allis had exhausted the subject, and had carried to completion the work of these other men. Medical science, however, is progressive, and it is dangerous to speak of finality. There remained to be written another chapter adding to our knowledge of hip-joint dislocations, and it would be a chapter based not alone on experimental studies in the dissecting-room on the cadaver, but on a clinical study of cases with the aid of the X-ray.

In reporting some cases of dislocation before the Surgical Section of the American Medical Association last year, and in reviewing the literature, the speaker was impressed with the fact, which he did not believe had been sufficiently emphasized, that

fragments of bone were the most common cause in preventing reduction by manipulation, as shown by a study of old unreduced dislocations. For instance, in eleven cases of dislocations of the elbow-joint reported by Vamossy, from Nicoladoni's clinic, which could not be reduced by manipulation, in nine of them fragments of bone were found which prevented reduction. In seventeen cases of dislocations of the elbow-joint reported by R. Bunge, fragments of bone prevented reduction in fourteen, and Dr. Bevan found fragments of bone in two of his own cases. He presented some skiagrams showing large fragments of bone which prevented reduction in an elbow-joint dislocation. Unfortunately, our knowledge of hip-joint dislocations was not as extensive, speaking numerically, as that of elbow-joint dislocations. Hip-joint dislocations formed a little more than 1 per cent. of all dislocations.

He was much interested in a statement which Dr. Allis made to him in a letter not long since, in which dislocations were discussed, and he (Dr. Allis) made this comparison, that the cases operated upon for old hip-joint dislocations were as rare as white blackbirds. Hip-joint dislocations, therefore, were not nearly as common as those of the elbow-joint. At the same time, surgeons had already some valuable data furnished by the X-ray.

The speaker detailed three cases of hip-joint dislocation, in two of which fragments of bone were undoubtedly the main factor in preventing reduction. In one of these, a case of Dr. McArthur's, a skiagram showed distinctly a dislocation of the hip-joint, with a large fragment of the acetabulum. He also exhibited the skiagram of the second case showing very distinctly a dislocation with a bony fragment from the acetabulum. There can be no question but that the bony fragment was one of the causes, if not the chief cause, of failure of reduction in this case. In a third case of his own, there was a large fragment from the acetabulum, which was the cause preventing reduction. Fragments of bone, as shown by the X-ray, are common in hip-joint dislocations, and are important factors in preventing reduction.

DR. M. L. HARRIS called attention to one or two points which had seemed to him of considerable importance. The first was, if surgeons knew the exact manner in which an injury had been produced, they could predict with great certainty the exact lesions which had taken place. This was so true as to be almost

an axiom. Its recognition had been the result of much experimental research as well as clinical observation.

When Dr. Allis told the Society, after he had produced the first fracture of the femur, that he knew it was a spiral fracture and marked out its course, he (Dr. Allis) knew from experiments of his own, as well as those of others, that force applied in the manner in which he applied it would produce the kind of fracture which he illustrated. Königschmidt had worked for years in experimenting on injuries and accidents to the knee with the same enthusiasm that Dr. Allis had worked upon injuries of the hip, and he enunciated as the result of investigations this, that if any one could tell him the manner in which an injury of the knee occurred, he would tell the exact lesions which would be found upon dissection. The practical importance of this was, that in all cases of injury the first duty which devolved upon the surgeon was to learn from the patient the exact manner, or, as nearly as possible, in which the injury was produced. If the surgeon could learn this, the diagnosis in the majority of cases could be made.

There was one point which he regarded of extreme value in the diagnosis of injuries of the hip, and that was the range of motion which may be communicated to the lower end of the femur. It had been found by experiment that the range of motion, if traced upon a plane, was so characteristic for the different dislocations that when recognized, it determined the exact position of the head, and the diagnosis was often comparatively easy. The two points, then, which he would make, and which the experiments of Dr. Allis illustrated, are: (1) To learn, if possible, the exact manner in which the injury had been produced to the hip. (2) To trace the range of motion which may be communicated to the lower end of the femur in arriving at a diagnosis.

## EDITORIAL ARTICLE.

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### RESULTS OBTAINABLE IN THE TREATMENT OF DENSE, TIGHT, DEEP-LYING STRICTURES OF THE URETHRA.

THE recent death of Fessenden N. Otis naturally recalls to the attention of surgeons the great services of that eminent man in pointing out more definitely and clearly than had ever before been done the indications which were to be accomplished for the curing of urethral stricture, as well as in devising practical means for answering these indications. Thirty years have passed since Otis began the publication of his views and observations. At that time the urethra which would admit a No. 12 English sound (No. 22 of the French scale, that is, twenty-two millimetres in circumference) was accepted as of full calibre throughout. The positive dictum of Sir Henry Thompson (London *Lancet*, 1875, December 11, p. 827), then the recognized highest authority in genito-urinary surgery, was that a urethra through which a No. 10 or 11 flexible English gum-elastic bougie could be introduced easily, without being held on withdrawal, was free from stricture, and needed no use of instruments whatever. The natural inference from the acceptance of such a standard was that when a contracted portion of a urethra had been dilated so as to permit the easy passage of an instrument of the calibre named, the full duty of the surgeon had been discharged. The general experience, however, was that a stricture which had been dilated up to that calibre soon recontracted if the introduction of sounds was intermitted for any length of time; and the general surgical teaching was, once a stricture always a stricture, and the unhappy possessor of such a lesion had no better outlook than the



regular use of a sound during the rest of his life! In the early sixties the book placed in my hands as an introduction to the study of surgery was the book of Robert Druitt. His section on urethral stricture was closed with this sentence: "In whatever manner a stricture has been cured, the bougie should still be used at intervals, to prevent a fresh contraction." It is true that Bumstead, who then was just beginning to enjoy the repute which his newly published work on venereal diseases justly earned for him, had pointed out (Ed. 1864, p. 249) that in strictures which speedily relapse after the cessation of treatment, free dilatation with instruments carried in some instances as high as No. 15 or 16 (equal to Nos. 26 and 28 of the French scale) renders the cure much more permanent. Yet this was suggested only as an occasional practice in exceptionally resilient strictures, for in the preceding sentence he had said that usually it was sufficient to dilate to a calibre corresponding with that of the external meatus.

The result of the practice based on these teachings was inevitably incomplete and unsatisfactory.

What Otis did was to seize the already known anatomical fact of the normal distensibility of the urethra, and give to it its true clinical value as an aid to the attempts of the surgeon to permanently overcome pathological contractions along its course. A new standard as to the degree of dilatation to which a strictured urethra should be subjected was established. The twenty millimetres of Thompson and the exceptional twenty-eight millimetres of Bumstead grew to thirty-six and forty millimetres as the circumference of the sounds which urethræ were required to accommodate.

More clearly and positively than any of his predecessors did Otis insist that recontraction of a stricture could be prevented by a complete division through the tissue of inflammatory new formation that constituted its essence, followed by the temporary use during the period of healing of sounds large enough to stretch

to the full degree of distensibility the mucous canal. According to the new doctrine the essential thing in the treatment of stricture was always to cut it, to cut it clear through until normal tissue was reached, and this, whether the coarctation was so slight as to demand a bulb of large size to demonstrate it, or so close as to be impassable for any instrument whatever. This having been done, and subsequent dilatation of the part having been maintained until the granulating surface produced by the dilated wound had become covered by epithelium, recontraction could not take place.

The treatment of urethral stricture was thus brought into the category of operative surgery, with a fixed indication to be accomplished and a definite reparative process to be secured. Otis was doing for men a good which was comparable to what his neighbor, Emmet, was doing at about the same time for women when the latter brushed aside the cauterizations, the scarifications, and the endless repetitions of "treatments" that were being employed for the cure of so-called ulceration of the cervix uteri by demonstrating that the condition was one of ectropium of the tender mucosa of the canal of a lacerated cervix, and that the condition called for a plastic surgical operation to restore the cervix to its proper form. So, *mutatis mutandum*, in cases of stricture Otis replaced the endless chain of moderate dilatations by bougie and sound, with their temporary effect of partial relief and later recontraction, and the scotchings of the divulsors and urethrotomes before in use, by a single well-devised and logical operative procedure through which a permanent cure could be secured.

Such results he claimed to have himself secured in a large number of cases, and in the closing paragraph of his book which was published in 1878 ("Stricture of the Male Urethra: Its Radical Cure," New York, G. P. Putnam's Sons, 1878), he asserts that his results are not exceptional, and may be attained by any surgeon who will provide himself with the necessary instru-

ments for the performance of dilating urethrotomy, and use them in accordance with the plans and principles set forth by him, and with the exercise of such judgment and skill as are considered essential to success in any other operation of like importance.

Has the experience of other surgeons since that writing confirmed, modified, or negatived these affirmations of Otis? As a contribution to the answer of such a question, the present brief report is offered.

I have selected for presentation only cases in which the site of the most important constriction was in the deeper urethra, in the bulbous and bulbo-membranous portions, and in which the degree of the diminution of the lumen of the canal was so great as to produce serious obstruction to the passage of urine. These are cases which present in the highest degree the difficulties which may attend the management of stricture; the complications of urinary extravasation, perineal suppuration, and fistula are frequent; the accident of complete retention is always imminent, and the evils of over-distention of the bladder and of ascending infection of ureters and kidneys not infrequent. They are frequently accompanied by lesser degrees of constriction at various points along the anterior portion of the canal.

For the relief of the deep-lying stricture, systematic division by incision through the perineum is in a large proportion of cases the only method available, and in all cases is now accepted by surgeons as the best and safest procedure to adopt, owing to the security against the accidents of infection which the free external cut affords.

A stricture which has been incised in this way certainly exemplifies the effect of the cardinal principle of treatment of the Otis doctrine, viz., complete division of the constricting mass of inflammatory new formation into normal tissue. The application of the second part of the treatment, *i.e.*, the maintenance of the highest possible degree of dilatation allowed by the normal dis-

tensibility of the sound urethra while the longitudinal cut in the urethral wall was healing over, follows naturally, and is easy of practice after the *débridement* of whatever constrictions may be present in the anterior urethra, involving always a free incision of the external meatus. If, in such a class of cases as these just described, the method in question may be so used that as a rule a permanent restoration of the normal calibre of the urethra is secured, that is to say, one in which there is no tendency to recontraction upon the cessation of the practice of dilatation after a reasonable length of time of its use, then it is safe to say that strictures in general are curable by such a method.

Now, what has our experience taught us to be the real state of the case?

During the past fifteen years I have had under my care between forty and fifty cases of such dense, tight, deep-lying stricture of the urethra that immediate external perineal urethrotomy has been demanded for the relief of the urinary obstructions which they manifested. I find among my records notes of more than forty of these cases, and there are quite a number more that I recall of which I have presented no notes. I do not intend, however, in this communication, to give a detailed analysis of these cases, nor to consume time and exhaust patience by recounting the history of individual cases. I shall confine myself with much brevity to general results.

The severest types of perineal and scrotal extravasation, and gangrene, of cystitis and pyelonephritis, have been illustrated by some of these cases, and in consequence a certain degree of mortality is presented by them. Many of them, when they came under observation, were in a condition of profound prostration from pain, sepsis, and uræmia in various proportions. In three cases death was not arrested by the operative interference. In a fourth case a fatal pneumonia developed two weeks after the operation upon the urinary tract, the healing of which had pursued an uncomplicated course.

On the other hand, in some apparently desperate cases, most gratifying response followed the efforts made, and unexpected recoveries, with restoration to sound health, both local and general, were secured. Most of these cases applied for hospital relief, and thus came under my care, in consequence either of complete retention or of extravasation of urine and acute urinary abscess, or for intractable perineal urinary fistulæ. As a rule, efforts at introducing even the smallest catheters through the urethra into the bladder were unsuccessful, and in many cases temporary relief was first given by suprapubic aspiration. I am free to say that I have never felt justified in resorting to prolonged efforts to secure mayhap the passage of a filiform instrument through these strictures. If a No. 2 or No. 3 English olive-tipped catheter does not readily pass, the aspirator should be employed and preparations for perineal section made.

As to the technique of the perineal section, it is not necessary to dwell on it at length. Most of the cases required careful and extended perineal dissections without a guide to find the vesical end of the obliterated canal. I have not hesitated to make as free external incisions as was needed to secure adequate exposure of the deeper parts. I have in some cases dissected out and cut away the infiltrated, distorted, and hardened mass of cicatricial tissue into which the urethra has been converted for a length of one-half or three-quarters of an inch, and, freeing the healthy ends of the urethra, have secured them together by sutures in the depth of the wound. In the majority of cases the constricted portion of the urethra has been simply freely incised along its floor until, by the use of the gorget of the lithotomist and the tip of my index-finger as dilators, I have been able to introduce my index-finger through the dilated membranous and prostatic portions of the urethra into the bladder. The middle of this finger has a circumference of six centimetres, and thus corresponds to a sound which would be No. 60 of the French scale, and this is the amount of dilatation short of which I do not feel satisfied to leave such a case.

As the first step in the management of these cases, the anterior urethra, by means of incision of the meatus and the use of an urethrotome to divide any structures of larger calibre along the penile portion, is dilated until it permits the passage of a No. 40 sound. This is my standard for the average adult. In my earlier cases I stopped at Nos. 34 and 36, but soon had reason to see that a higher degree of primary dilatation insures a smoother and more satisfactory after course.

The anterior urethra having thus been fully dilated, the bulbous urethra freely incised, and the membrano-prostatic portion having been over-stretched, the No. 40 sound is finally passed through the whole urethral tract from external meatus to bladder as a final demonstration of the adequacy of the means used to restore patency to the canal. This sound having been withdrawn, a piece of rubber tubing of about the same calibre is passed through the perineal wound along the urethra into the bladder and secured by a suture point to the walls of the wound which are brought up to it by the suture. The deeper wound is packed with iodoform gauze and the operation is finished. On the fourth or fifth day this tube is removed, and under cocaine or nitrous oxide sounds are introduced from the external meatus to the bladder, using usually Nos. 36, 38, and 40 in succession. This is repeated every third day for two weeks, then once a week for a month, then at rapidly increasing intervals, once in two months, six months, twelve months. The object to be attained is the frequent stretching of the new plastic material effused for the repair of the longitudinal wound that has been made until it is fully covered with a sufficiently thick layer of epithelium on its mucous surface, and its texture is fully organized, lax, and distensible. The laparotomists, the herniotomists, and the appendicetomists have of late years added so much to our knowledge of the distensibility of scar tissue, that the urethrotomist has far less reason to distrust the efficacy of his attempts to secure a stretching of his longitudinal scar in the urethral mucous mem-

brane than he might have had twenty-five years ago. The thing to do is, first, to get the longitudinal scar, and it is this which Otis taught us how to do. How many of my own cases are to-day free from any reconstriction, I do not know. Of most of them I have no knowledge since they were discharged from the hospital. Of them all only one has come back on account of recontraction. This was in the case of a young fellow of twenty-eight years, who was insubordinate and uncontrollable, and gave up treatment prematurely. Fifteen months later he came back in as bad a plight as at first. I reopened his perineum and had to excise three-quarters of an inch of his damaged urethra in order to put the parts in a condition conducive to future immunity. This time he was perfectly tractable. Six months later a No. 36 passed readily. I saw him again some four or five years later, when he stated to me that he was still perfectly well; but I made no examination.

One of the cases operated on in 1894 was that of a man with a traumatic stricture of nine years' duration. It had become impassable to instruments. I found the urethra involved in a mass of scar tissue of such length and density that it was necessary to dissect out more than an inch of its substance to secure good tissue for a new canal. This man has been coming to see me about once in six months ever since for observation. I have seen him within a month, at which time a No. 36 sound passed as readily as it did six years ago.

A gentleman operated upon in 1892, without a guide, a typical example of a dense, tight, deep-lying stricture of gonorrhœal origin, was last seen by me two years later, at which time there was no suggestion of recontraction, a No. 34 sound passing smoothly and easily into the bladder. Four years later I heard from him to the effect that he remained perfectly well. A gentleman, a duplicate of the preceding case, who was operated on in May, 1899, returned for examination twelve months later, eight months having elapsed since the introduction of any instru-

ment. No recontraction had taken place, a No. 36 sound passing freely throughout the urethra into the bladder.

These few cases are the only ones whose later condition I can speak of. They exemplify, however, the worst cases, and justify the expectation that the same methods of treatment would be followed by equally good results in similar cases as a class, even more certainly also in those more frequent cases in which the exudation is less extensive and the constriction is less close.

The writer does not wish to be understood as taking the position that in all cases, nor, indeed, with certainty in any given case, a surgeon would be justified in promising permanent immunity from recontraction by the adoption of the method of treatment described, or by any method of treatment whatever. The variations in the local conditions presented by different individuals are so great, and so impossible of recognition beforehand, involving, as they do, individual peculiarities of tissue-irritability and repair, of the readiness of tissue to yield to distention, of the activity of the absorbents, of freedom from sources of infection and renewed local irritation and exudation, that the best and most carefully conducted efforts of the surgeon may fail at times to secure the ideal result.

What I do wish to emphasize in this tribute to the work of Otis is that without question he pointed out a way whereby in the management of the worst forms of urethral stricture a full *restitutio ad integrum* could be secured in many instances. And further I would urge that this ideal result should not be denied as often attainable, and that it should always be kept in mind, and should cause the more general adoption in practice of those measures most likely to secure it.

LEWIS STEPHEN PILCHER.



## INDEX TO SURGICAL PROGRESS.

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### GENERAL SURGERY.

I. Experimental and Clinical Research on the Application of Peroxide of Hydrogen in Surgery. By DR. B. HONSELL (Tübingen). This article represents the author's praiseworthy efforts in having placed on a scientific basis the status of  $H_2O_2$  in surgery. As to its physiological and pharmaceutical properties, the author states that a 3 per cent. (weight)  $H_2O_2$  causes marked changes in both fresh and defibrinated blood, provided it is mixed in sufficient quantities with either. It kills infusoria and probably other isolated cellular elements. Living tissues suffer none by virtue of any chemical influence of the peroxide of hydrogen. Any damage may be traceable merely to mechanical action of liberated oxygen gas. The injection of  $H_2O_2$  into the circulation, the peritoneum, or connective tissue kills the animals if sufficient peroxide be introduced. Death is caused by gas embolism of the lungs, nor could it be proven that death followed from any other cause. The application of  $H_2O_2$  (3 per cent.) on free surfaces or open cavities cause neither local nor constitutional disturbances, no matter what quantities be used. More to the point in its bearing on the modern anti-bacterial treatment of wounds are the following conclusions of bacteriological experiments. A 3 per cent.  $H_2O_2$  is the equivalent of a 1-1000 sublimate solution acting on bacteria suspended in aqueous solutions, but  $H_2O_2$  is superior to it in media rich in albuminous fluid and poor in cells; where the latter predominate, it is again on a par with solution of sublimate. The bacterial properties of 1.5 per cent.  $H_2O_2$  is inferior to aqueous solutions

of sublimate, but in media rich in albumen, wanting in cells, it is superior to it. A 2 per cent. solution of acetate of alumina can in no way compete with  $\text{H}_2\text{O}_2$ . If the bacteria are in organic fluids, the antiseptic power of  $\text{H}_2\text{O}_2$  diminishes in direct proportion to the extent of the catalysis of  $\text{H}_2\text{O}_2$ , effected by the respective solutions. In so far as we can draw conclusions from test-tube reactions, the powerful antiseptic action of  $\text{H}_2\text{O}_2$  can be developed in urine and drinking water, provided decided quantities of albumen are not present; on the other hand, in conditions met with in wounds whose catalytic tendencies will be marked, no more effect will attend its application than the use of  $\text{HgCl}_2$  or acetate of alumina under like conditions.

At the clinic of Tübingen 1 per cent. solutions were used on granulating and suppurating surfaces. The experience of the author concurs in the main with the practical results claimed by L. Championnière for  $\text{H}_2\text{O}_2$  whence he concludes that  $\text{H}_2\text{O}_2$  exerts a beneficial influence on the course of suppurating wounds, particularly putrid and gangrenous processes. On fresh operating wounds it causes neither local nor benign remote consequences. Foremost as the cause of its influence on septic processes is its mechanical action of foaming the secretions. The chemical action, however, of  $\text{H}_2\text{O}_2$  by virtue of its nascent oxygen was not proven. Perhaps a direct action of  $\text{H}_2\text{O}_2$  on the tissues may exist. The foaming effects a cleansing of the wound surface without any injurious action, wherefore its superiority over acetate of alumina or sublimate solutions. Whilst its hæmostatic properties may make it available to the otorrhinologist and the gynæcologist, in the strictly surgical field a chemical hæmostatic is no longer sought. As a deodorizer, it is instantaneous, powerful, and has no equal.—*Beiträge zur klinischen Chirurgie*, Band xxvii, Heft 1.

**II. Chloride of Zinc Cauterizations for Inoperable Tumors.** By DR. FRIEDRICH VOELCKER (Heidelberg). The indication broadly stated for cauterizations begins when the knife

and chisel have attained their limitations, fostered still further by the humane desire to separate the incurable from the inoperable, since, in the interest of humanity, the physician must heal as well as cure.

Carcinomata and malignant growths which, coming to the surface, are prone to ulcerate and which, because of their great extent, are deemed inoperable, constitute the principal class of cases for this treatment. At Czerny's clinic, where the limits for operative interference are pushed to an extraordinary extent, ninety-five cases are detailed of which 3 per cent. attained the three-year-cure standard. The remainder were in the main greatly benefited. The method of the application of zinc chloride consists in a preliminary curettement of all possible broken-down neoplastic tissues, then a thorough hæmostasis, waiting twenty-four hours, if necessary. This accomplished, gauze, which has been steeped in variable strength of aqueous solution of zinc chloride and thoroughly dried, is applied to the raw surface and allowed to act, depending on the extent of slough desired. To guard against undue cauterization on adjoining mucous surfaces, the parts should be well greased with vaseline, or, as in the case of the vagina, it may be tamponed with dry cotton impregnated with a solution of bicarbonate of soda. By applying the zinc thus on the gauze every nook can be reached, and the gauze is easy of removal. For surface carcinomata, "Canquoin's Paste," of varying percentage and thickness, may be used. Aside of growths too extensive for operation, growths of limited extent, which because of their disintegrated condition are liable to contaminate by infection the wound in the act of removal, are also reserved for caustics. Another indication for the removal of limited neoplasms arises when diabetes or nephritis forbids operative interference. The proximity of the respiratory tract, the œsophagus, serous membranes, hollow viscera, call forth contraindications for its use. Gersuny and Langenbuch determined experimentally that no danger need be feared from the action of

zinc chloride on larger vessels, since it causes a thrombosis of them. The hæmorrhage that is to be feared follows the hasty removal of the eschar or any early attempts at curetting. The action of zinc chloride is based on its dehydrating properties, which render the salt soluble, so that it penetrates into tissues destroying the red blood-cells, causing mummification of the tissues. Others claim that its action on the cells is one of coagulation necrosis. The cauterization of the wound surface entirely inhibits the absorptive power of the granulations, so that no toxic symptoms need be feared. After eight to twelve days the eschar is cast off. By such repeated cauterizations any desired extent of growth may be removed.—*Beiträge zur klinischen Chirurgie*, Band xxvii, Schluss, Heft 3.

## NECK.

**Radical Operation for Diverticula of the Œsophagus.**  
By DR. F. VEIEL (Tübingen). Conjointly with the account of the radical operation performed by Bruns for the cure of so rare an affection as diverticulum of the œsophagus, the author records and analyzes twenty-two reported cases of radical cure. The history of the operated case is that of a female, aged fifty-seven years, who had noticed since youth a smacking noise attending all deglutition, but only the progressive interference with swallowing during the past seven years impelled her to seek relief. The rapid swallowing of water or finely divided food caused a bulging at the anterior margin of the sternomastoid. Upon bending forward or after violent attacks of coughing, all fluid and food were brought up again. A sound passed into the œsophagus entered the diverticulum, and the button could be palpated just behind an existing struma.

An incision was made along the anterior margin of the sternomastoid, exposing the œsophagus. At the level of the cricoid cartilage a saccular enlargement of the œsophagus was encoun-

tered. After isolation of this latter, a purse-string suture was applied and the redundancy ablated; to still further guard against leakage, a Lembert suture was applied. The lower angle of the wound was tamponed with gauze and a drainage tube inserted. During four days following no food was given per os. On the seventh day change of dressing, on the ninth day all drainage gauze removed, and within four months the closure of the wound was complete. At no time was there any leakage of the ingested food.

As to the other twenty-two cases, differences existed principally regarding the technique. While Kocher advocates a transverse incision, most of the others stand for a vertical incision. Only three cases are noted with primary closure of the œsophagus wound. The failure being due to the want of care to apply sutures in the same fashion as for intestinal work, and in addition the hastiness to give food by mouth. Since five deaths (25 per cent.) occurred among these twenty-two operated cases, the author passes in review some worthy methods other than operative which effected a cure. Thus by lying on the side opposite to the diverticulum, mere gravity, it is claimed, will divert the food from the diverticulum, and this, if sufficiently long persisted in, will cause an atrophy of the sac. With the same purpose in mind repeated use of the sound may accomplish a cure. Faradization of the sac has also been successfully tried. In three instances where inanition set in gastrostomy had to be resorted to. In opposition to removal of the sac, invagination has been proposed and performed with good result. In conclusion, the author comments on the apparent reluctance to the performance of the radical operation, which he accounts for chiefly on the ground of failure to recognize the condition, and then the invariable attendance of cellulitis, in the pre-antiseptic days, which deterred operators from the performance of this capital procedure. Though a mortality of 25 per cent. is associated with this operation, the eventual fate of starvation and possible contingency of

carcinomatous degeneration justify operative interference, which, with the increased experience from the frequency of performance, must needs reduce this mortality considerably.—*Beiträge zur klinischen Chirurgie*. Band xxvii, Schluss, Heft 3.

### EXTREMITIES.

**Torsion Fractures of the Leg.** By DR. H. ZUPPINGER (Zurich). This article offers twenty-two clinical observations on the production of spiral fractures of the bones of the leg, together with conclusions as to the reproduction of this variety of fracture experimentally by torsion. Every torsion executed by a one-sided lever (force) is associated with some bending of the bone, which bending will be greater in inverse proportion to the length of the lever. The level of the fracture is determined by the weakest cross-section of the bone. The spiral shape of the line of fracture is an expression of the torsion. The beginning of the spiral fracture and the ending of the same are dependent on the situation of the axis of torsion and on the disposition of the greatest tension from bending. The ascent of the spiral depends in greater part on the elasticity of the bone. For the leg the following mechanism obtains. External rotation of the foot by force acting on the anterior half of the foot causes a spiral fracture in the lower half of the tibia with the fracture terminating posteriorly and a fracture of the fibula at a higher level. The direction of the spiral is right sided on the left foot and *vice versa* for the right. Inward rotation of the foot by forces acting on the anterior half of the foot causes a spiral fracture of the fibula at a low level, eventually with fracture of the internal malleolus. The spiral is left on the left side and right on the right side. External rotation by forces acting on the outer surface of the heel also cause a low fracture of the fibula and fracture of the internal malleolus. The spiral passes to the right on the left side and *vice versa* on the right side. Inward rotation of the foot by forces acting on the inner surface of the heel causes a torsion fracture in the

lower half of the tibia with terminal fracture on its posterior surface and a fracture of the fibula at a lower level. The spiral is right sided on the right side and left sided on the left side.—*Beiträge zur klinischen Chirurgie*, Band xxvii, Schluss, Heft 3.

MARTIN W. WARE (New York).

## VASCULAR SYSTEM.

**Histology of Artery Sutures.** By DR. H. JACOBSTHAL (Rostock). The finer details identified with the healing of wounds of arteries closed by suture were made the subject of research in animals.

The wound defect in the walls of the vessel is filled with coagula and fibrin, which extend into the coats of the arteries as far as the adventitia, and even perivascular spaces. Scant deposits are formed in the lumen about the suture and the intima. Within the first days endothelial proliferation sets in about the threads and clots, encapsulating them so as to exclude them from the lumen. Soon a very active new formation of connective tissue and new blood-vessels are met with in the adventitia, slightly so in the media, thus effecting an organization of the coagula. The result of aforesaid is a rich endo,- meso,- and periarteritis. Now regressive changes set in, finer cells are formed, poorer in protoplasm, separated by fibrous tissue of a colloidal nature in the adventitia and media. Whereas in the intima said tissue appears in the form of fine fibres and elastic lamellæ, thus constituting a second elastic layer. Remains of fibrin and the disintegrated blood-clots are met with in all layers. The suture (silk) jutting into the lumen is encapsulated by endarteritis proliferans. In the adventitia it is embedded in granulation tissue abounding in giant cells. Its absorption is at any rate extremely slow, and it is questionable whether it is ever totally absorbed, more likely is its permanent retention as a foreign body. A regeneration of muscle fibres was never noticed. The

likelihood of the scar eventually weakening and giving rise to aneurismal dilatation because of absence of muscle fibres has not been conclusively proven, inasmuch as none of the animals experimented on were controlled beyond 100 days.—*Beiträge zur klinischen Chirurgie*, Band xxvi, Heft 1.

## RECTUM AND ANUS.

Results of the Extirpation of Rectal Carcinomata. KROENLEIN (Zurich) aims in his paper to answer three fundamental questions bearing on the radical operation for carcinoma recti, viz., mortality of operation, recurrence, and functional disturbance (incontinence). To this end, 881 cases collected from numerous clinics show that the sovereign method is extirpation of the rectum; that in 80 per cent. of the cases it is curative, said cure being lasting in 14 per cent., and that functional result is at its height when the dragged-down bowel is made to terminate at its normal site with preservation of the sphincter and anus. The employment of perineal or sacral method should be elective, dependent on the needs of the case, the latter being reserved exclusively for high-seated carcinoma. Even in rectal carcinoma, the principles of conservative and plastic surgery (suture of mucous membrane and plastic sliding flaps of mucous membrane) should be applied.

In the discussion, Kraske expressed his satisfaction in 120 cases with his sacral method, but thinks the combined abdomino-sacral method to be a still more radical one. A laparotomy is first performed,—ligation of superior hæmorrhoidal artery follows, whereby a bloodless operation for the division of the peritoneal investment of the bowel, resection of mesocolon and mesorectum with their contained glands can be removed. Tamponade of the wound and provisional suture are followed by the usual sacral incision. It will be seen that the great gain consists in removal of regional glands.



Steinthal (Stuttgart) proposed his method of invagination of the new growth with resection applicable to those cases which could not stand the loss of much blood.

Rehn (Frankfort) favored perineal (vaginal) incision combined with the parasacral for higher carcinomata. He demands a high excision for carcinoma of the anus or any carcinomatous proliferation of the rectal wall.

Hochenegg (Vienna) emphasized the necessity of preservation of the sphincter to attain continence. This was best accomplished by his well-known method of anchoring the proximal segment of bowel in the grasp of the preserved anal segment denuded of its mucous membrane. His figures in 121 sacral operations personally performed are 5 per cent. mortality and 25 per cent. cure.

Wölffler (Prag) says that the failure to attain better continence with all the improvements in the preservation of the sphincter is due to the greatly altered innervation of the parts, with a consequent diminution in the reflex excitability of the mucous membrane.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIX Congress.

## URINARY ORGANS.

**The Freezing Point of the Blood as an Index to Kidney Function.** By DR. H. KÜMMEL (Hamburg). Although ureteral catheterization with the cystoscope has in experienced hands reduced the diagnosis of kidney diseases to a nicety, and may leave no doubt as to the activity and soundness of the opposite organ, yet the degree of sufficiency of the opposite kidney was inferred by determining the amount of area in a specimen from the total twenty-four hours' urine voided by both kidneys. This factor is too variable for absolute reliance, for it has been assumed that if the urea was below one-half the normal quantity a single kidney would not suffice for the body.

A far greater degree of certainty as to kidney sufficiency can be obtained by determining the molecular concentration of urine. The molecular concentration of any fluid is expressed in its freezing point, which is lowered proportionately to the degree of concentration; furthermore, osmosis has an important bearing on this phenomenon, since osmotic pressure between any two fluids separated by a membrane is directly proportional to the quantity of molecules in suspension. Blood and urine (in the sense of being solutions) are subject to the laws of osmosis. The blood under normal physiological conditions has a fixed freezing point  $-0.56^{\circ}$  C. Now, if the normal metabolism is maintained by the urinary excretion of the kidneys, the normal freezing point of the blood will serve as an index of renal sufficiency. As soon as the kidney acts insufficiently, the metabolic products are stored in the blood, its molecular concentration increased, and the freezing point lowered. Koranyi, the originator of this method, found a lowering of freezing point of blood in nephritis, tumor, hydro- and pyonephrosis, and also in animals upon the ligation of both ureters. Of practical significance is the observation that no change of freezing point of blood follows when one kidney remains, an observation which harmonizes with clinical experience of the rapidity with which the remaining kidney compensates for the loss of its associate. It would seem natural to rely at once on the freezing point of urine, but the physiological limits of the latter are too wide. Normally, a fluctuation of  $-1^{\circ}$  to  $2^{\circ}$  C. obtains. In general, it may be said if the freezing point of urine is lowered by  $-1^{\circ}$  C., the kidneys are diseased. If the urine from one kidney be drawn by catheter, its freezing point would be of greater import. For practical purposes it may therefore be concluded that a diminution of the freezing point of blood to  $-58^{\circ}$  C.,  $-61^{\circ}$  signifies insufficiency of both kidneys, and operative interference should not follow until freezing point is about  $-56^{\circ}$  C. A freezing point of urine less than  $-9^{\circ}$  C. is an index of insufficiency of the kidney, but of most significance would be

the freezing point of the segregated urines respectively.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIX Congress.

## BONES—JOINTS—ORTHOPÆDIC.

I. Changes in the Surgical Technique of Joint Operations. By PROF. DR. KOENIG (Berlin). Joint operations deal with either infected or non-infected articulations. The former category embraces operations for traumatism of joints (resections), removal of bullets, foreign bodies, fragments of fractured bone, floating cartilage, resection for tuberculosis, neoplasm and deformity. As a prototype for such operations, the knee is chosen, wherefore fracture of patella is included.

Since the maintenance of joint function is the chief desideratum, a rigid asepsis must be guaranteed. This can only be attained by conducting the operation *instrumentally*, to the entire exclusion of any contact of the *fingers* with the wound, by employing the constrictor to render parts bloodless, as thereby sponge-contact of the wound is obviated, and in addition the operation is easier technically. Finally, by doing away with the irrigation with carbolic and sublimate solutions drainage can be dispensed with, and limited merely to resections where the secretion in the first days has to be carried off.

In his experience, Koenig found the X-rays of little value in the diagnosis of foreign bodies, floating cartilage, and neoplasms of soft parts of joints.

As to infected joints, while not belittling arthrotomy with continuous irrigations, it is, in rebellious staphylococcus and streptococcus joints, often possible by multiple counter incisions into the joint and a free exposure of all the pockets to avoid amputation.

In the phlegmonous variety of gonorrhœal arthritis, with scant effusion into the joint, but much infiltration into the peri-

articular tissues the whole course is cut short by extensive incisions, pain being markedly diminished, and some motion of the joint preserved. If, notwithstanding extensive lateral incisions into knee-joint, fever and discharge persist, threatening a pyæmic condition, a transverse incision above the patella dividing the tendon is justified to save life and limb.

In coxitis deformans, attended with marked deformity and outgrowth of osteophytes, a resection of femoral head is recommended.

In the discussion, Schede claimed that he could bring about a cure in most instances by antiseptic irrigations, provided the capsule and periarticular tissues are yet intact. In reply, Koenig admits this to be his point of view also, save in extreme instances, strongly suggesting amputation, when he recommends extensive incisions.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIX Congress.

**II. The Initial Stages of Coxa Vara.** By DR. A. SCHAUZ (Dresden). The author reasons by analogy from the state of affairs in scoliosis that coxa vara must also have a preliminary state of development. As a matter of fact, he finds that it shows itself at the age of fourteen, most frequently in males, unlike the preponderance of females in scoliosis. This discrepancy, he thinks, is only apparent, and is accounted for by the fact that only the males present themselves with advanced objective phenomena, since the females are not exposed to the severer insults as the male in the pursuit of his duties, and because the former soon yield, on the advent of any disquieting symptoms of locomotion. Consequently, in females the disease hardly gets beyond the initial stage.

From eight instances, all females, ages ranging from seven to seventeen years, the author has projected a picture of incipient coxa vara—characterized by bilateral limping, attended with pains radiating to knee when standing, disappearing in the recumbent position. No starting pains, no spasms, motion limited only in

one or two directions, viz., abduction and external rotation, slight atrophy of the hip muscles. With all of these there is as yet no elevation of the trochanter major, and that very slightly, if at all. Other closely allied diseases of the hip are ruled out for the want of the usually associated phenomena. Since so little can be done in the well developed case of coxa vara adolescentium, great stress is laid on the recognition of coxa vara before objective deformity has set in, i.e., at puberty, when by slight correction the properly directed statical forces can alone prevent the onset of deformity.—*Zeitschrift für Orthopädische Chirurgie*, Band viii, Heft 1.

III. Periosteal Tendon Implantation. By DR. F. LANGE (München). This operation was first instituted by Drobnik, the originator of tendon anastomosis, who, after a single unsuccessful application of it, abandoned the procedure. Lange was prompted to revive the method because his observation in ordinary tendon implantations taught him that the peripheral tendon stump, atrophic as it often is, subsequently stretched when joined to a slip of some active muscle, thus curtailing its efficiency. To obviate this, a tendon with muscle attached was longitudinally bisected, severed at its bony insertion, and this half implanted anew into the periosteum of some other bone. Such a procedure was applied to a lad of seven years, who at the age of two years had a poliomyelitis, which left the peronei and the extensor communis digitorum paralyzed. The antagonistic tibialis anticus caused a club-foot. After redressement of the foot in narcosis, at the same sitting the tibialis anticus was split and its external half separated from its original. Insertion was carried subcutaneously outward and implanted into the cuboid. Ten months later the function of the foot was restored to normal. At first it was difficult to bring the slip of the tibialis anticus to contract independently of its parent half, but by passive and active exercises this was accomplished.

In a second case, that of a female, aged twelve years, paralysis of the gastrocnemius following poliomyelitis caused pes calcaneus. This, still further complicated by paralysis of the tibialis anticus, added a valgus position to the foot. The most potent muscle, the *peronæus longus*, was severed from its insertion, passed between the fibres of the tendo Achilles, and inserted into the mesial surface of the os calcis. Thereby the plantar flexion was obtained, the foot turned inward, and the inner border of the foot raised. Finally, this method was applied in a case of quadriceps extensor paralysis after poliomyelitis. The semimembranosus and semitendinosus were severed at their insertion into the tibia and fibula respectively. They were then made to pass forward subcutaneously, overlapping each other about two fingers' breadth above the patella. From this muscular loop two stout silk strands were passed over the patella subcutaneously to be inserted into the head of the periosteum of tibia. These silk strands were intended to form irritating centres about which connective tissue would form so as to bridge the interval between the loop of muscles above and the tibia below (used successfully by Glück and Kümmel). Eight weeks later extension of leg was possible while lying on the side, but it could only be partially maintained in the horizontal position, while standing without any mechanical support was the most marked gain. Six months later the new-formed connective tissue tendon is as thick as a lead-pencil and extension can be carried to forty-five degrees in horizontal position. Of two other cases likewise operated, one approached the absolute normal function of extension, the other could only be extended to forty-five degrees.—*Zeitschrift für Orthopädische Chirurgie*, Band viii, Heft 1.

MARTIN W. WARE (New York).

## REVIEWS OF BOOKS.

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THE INTERNATIONAL TEXT-BOOK OF SURGERY. By American and English authors. Edited by J. COLLINS WARREN and A. PEARCE GOULD. Volume II. Philadelphia: W. B. Saunders & Co., 1900.

The second volume of this work is devoted to regional and special surgery, the chapters devoted to each subject being written by men of experience and international reputation. As a rule, the best modern practice is exemplified and set forth in these pages, and the second volume forms a worthy companion to its predecessor. The chapters on appendicitis and that on hernia are perhaps the most noteworthy in the book. The first is a masterly epitome of the surgery of the appendix. We know of no article of similar length in which is condensed so much judicious advice on this subject. It is eminently practical, contains nothing which is speculative or doubtful, and is exactly what is needed for a work of this character. The advice is clear and unmistakable, the operative technique is adequately and clearly described, and the occasional operator will find this chapter invaluable. The article on hernia has been written by men of exceptional experience in this branch of surgery. The amount of material at their disposal in the Hospital for Ruptured and Crippled has been enormous, and, if experience ever entitles authors to speak with authority, the writers of this chapter have that right. It is believed that they voice the general experience of surgeons in preferring the Bassini operation to all others for the radical cure of hernia; so, too, when they express a preference for absorbable sutures as opposed to silver wire or silk. The illustrations which

accompany their description of Bassini's operation elucidate the technique, so that it is impossible for a reader to misunderstand it. The general subject of hernia is succinctly treated, and is an admirable example of the art of compression as applied to description.

The surgery of the breast is discussed by Dr. Warren. An excellent description is given of the lymphatics of the gland and their manner of communication with those of the mediastinum, and the histological pathology is set forth as completely as could be expected in a work of this length. The various tumors which occur in this locality are discussed from the stand-point of the pathologist first, their clinical features and therapy following, which is in line with the general plan of the work. The technique of abdominal surgery is well described by the same author. Indeed, the chapters contributed by him are among the best in the book. In the chapter on congenital deformities of the lips and mouth, we are met by the statement that many surgeons advise the removal of the os incisivum. This may have been true some years ago, but it is distinctly at variance with the practice of most surgeons at present and with the advice given in most text-books. In the chapter on diseases of the mouth and jaws we read that disturbances of the brain, stomach, and intestines follow dentition. It might be asked whether the disturbances of the stomach and intestine were not rather the cause of the convulsions and coma referred to rather than a concomitant dentition. The sentence reminds us of the stomach cough of our fathers. Ligation of the common carotid artery is recommended for wound of the internal carotid, which certainly leaves out of consideration the circle of Willis. The chapter on the surgery of the neck contains some surprises for American surgeons, particularly in the section devoted to excision of tubercular glands. The method of making separate incisions over each gland seems too ludicrous to have deserved mention, and scarcely better is the method to which preference is given of making one incision anterior to the sterno-



mastoid and a second, posterior. A third method involves two or three limited and "specially placed incisions," which we learn from the plate are transverse or oblique, and as far as the ideas of American surgeons are concerned entirely inadequate. The methods advised seem quite trivial and unworthy a place in an advanced text-book. Division of the sternomastoid is not mentioned, nor indeed is any complete operation for the removal of tubercular glands described. In another part of the chapter the difficulties of tracheotomy are greatly exaggerated. The description of the technique of laryngectomy is not at all in accordance with modern practice, and the author makes no mention of Semon's work in this field when writing of the prognosis. In the article on cicatricial contraction of the œsophagus, no mention is made of the division of the stricture after a preliminary gastrotomy by sawing through with a string, as described and practised by Abbe. It is unfortunate that the diseases of the genito-urinary organs have been entrusted to several different authors, as the book loses in unity of style and method. The article on the diseases of the penis, urethra, bladder, and prostate is remarkable for what it omits. Under the head of stricture, no mention is made of the newer methods of dilatation by the instruments devised by Oberlaender and Kollman, and under the section on the prostate one finds the advice given to perform a prostatectomy by the suprapubic route *always*. No mention is made of the eminently successful work of Nicoll, Alexander, Parker Symes, and others, in which the prostate is attacked by the perineal or combined route. True it is, in this country at least, that to interfere with these prostatic overgrowths through the bladder, even when the portion of prostate removed is quite insignificant, is often to cause the death of the patient. No mention whatever is made of Bottini's operation. This seems strange in the light of the work done by Bottini, Freudenberg, Willy Meyer, and others. Whatever the opinion of the author, this procedure has a recognized position among surgical methods, and

ought not to have been passed by. The chapter on diseases of the scrotum, testicle, and spermatic cord is short. One is surprised to find under the head of seminal vesiculitis that no mention has been made of the procedure of stripping the vesicles after the manner originally described by Fuller. The chapter on gynaecology is written by Henrotin, and is worthy of the reputation of the author. There is nothing to criticise save its brevity. A short chapter on the surgery of the uterus by McMurtry completes the chapters devoted to diseases of women. The chapters on the special surgery of the eye and ear are full and complete for a work of this kind. Indeed, it may be questioned whether too much space has not been devoted to these special subjects. It may be said with some show of reason that there is too much here for the general practitioner and not enough for the specialist. The surgery of the eye and ear is not for the general practitioner to meddle with, unless he would invite disaster, and the space devoted to these subjects would have been of more value if utilized for other purposes. The chapters on military, naval, and tropical surgery are timely and excellent, especially the latter. A very valuable chapter, which is unique in a work of this character, is that on traumatic neuroses. In reading this volume the reviewer has been struck by a want of uniformity in the matter contributed. It is a mosaic, nor are all the stones gems. Some of the chapters are of a high order of excellence, others hardly mediocre. The subjects have been too much subdivided, and, as a consequence, the work does not read smoothly. What possible reason was there for subdividing the article on gynaecology and placing the surgery of the uterus in a separate chapter by a different author? Why was it necessary to have one author write a chapter on the surgery of the neck and then a separate chapter on the surgery of the œsophagus? There are also separate chapters written by different men on peritonitis, the surgery of the stomach and intestines, and on intestinal obstruction. What possible utility is there in such subdivision? The surgery of the

genito-urinary system is split up in the same way, so that a separate chapter is devoted to the scrotum and testicle. It is a wonder that the epididymis did not receive similar honor. Whatever the reasons for this multiplication of authors, it has not added to the merit of the book, but has had the effect of making the different chapters strangely unequal in style and value.

ALGERNON THOMAS BRISTOW.

DISEASES OF THE GENITO-URINARY SYSTEM. By EUGENE FULLER, M.D., Professor of Genito-Urinary and Venereal Diseases in the New York Post-Graduate Medical School. The Macmillan Company. Pp. 774.

This book is intended by the author to represent more particularly the present state of genito-urinary practice viewed from the stand-point of the surgeon, and not of the dermatologist or "venereal" specialist.

The author has succeeded very well in his purpose, and has given to the book a strong impress of personal authority and opinion. This circumstance may perhaps somewhat modify the volume's influence, as it not infrequently represents the ideas of the individual, and does not therefore always accurately express the generally accepted practices in this branch of medical science.

The book contains twenty-two chapters; the first two are short, "Bacteriological and Surgical Considerations" and "Animal Parasites." The rest of the work takes up the diseases of each organ, from penis to kidney. Naturally, the seminal vesicles and the prostate receive a good deal of attention from the writer, who has already written extensively on these organs.

In general, only praise can be accorded for the teaching contained in this book. Occasionally one detects the limitations of the specialist, and more frequently an imperfect appreciation of the views and practice of others.

CHARLES L. GIBSON.

A TREATISE ON FRACTURES AND DISLOCATIONS. For Practitioners and Students. By LEWIS A. STIMSON, B.A., M.D., Professor of Surgery in Cornell University Medical College, New York. New (third) Edition. Octavo, 842 pages, with 336 engravings and 32 full-page plates. Philadelphia and New York: Lea Brothers & Co., 1900.

The second edition of Stimson's "Treatise on Fractures and Dislocations," being its first publication as a one-volume book, was reviewed at length in the *ANNALS OF SURGERY* of March last. The favor with which the work met is shown by the exhaustion of that edition in so short a period of time, and the industry and capacity of the author are evinced in the many and important additions which have been made in the present edition. A notable increase in the number of skiagrams has been made, and the great value of the Röntgen rays in elucidating the pathology of fractures is fully illustrated. Nothing could be more striking than the first plate (which is a new one), in which the comminuting effect of the passage of a modern small-calibred bullet of high velocity through a bone is well shown. The introduction of new cuts and of various paragraphs of text have added about twenty pages to the bulk of the book, but these make it no less a convenient hand-book for use.

LEWIS S. PILCHER.

DIE SUBKUTANEN VERLETZUNGEN DER MUSKELN. By DR. KNAACK, Stabsund Bataillions Arzt des II Bataillions, Infanterie Regiment, No. 175. Berlin: Aug. Hirschwald, 1900. Pp. 116.

This publication, emanating from the German army medical department, with most of its data culled from the military hospital records, is essentially written in the interests of military sanitation, which, however, does not in the least detract from its usefulness to the surgeon engaged in civil practice.

The various chapters deal with muscle hernia, muscle rupture, muscle contusion, and its sequelæ myositis ossificans, and dislocation of muscles (tendons). The pamphlet offers very instructive and interesting reading, greatly because of its novelty, since the above-mentioned topics are handled in a stepmotherly fashion, even in the most exhaustive surgical text-books. Thus a decided gap has been filled by the diligence of the author as evidenced in the extensive bibliography consulted. Intermingled with a rich personal experience is a careful critique of similarly reported cases. The author has given himself particular pains to elucidate the differential diagnosis of these closely allied affections which have so many symptoms in common. Equally complete is the exposition of the treatment.

MARTIN W. WARE.

A CLINICAL TREATISE ON FRACTURES. By WILLIAM BARTON HOPKINS, M.D., Surgeon to the Pennsylvania Hospital, and to the Orthopædic Hospital and Infirmary for Nervous Diseases. 268 pages, 126 illustrations. Octavo. Philadelphia: J. B. Lippincott Company, 1900.

The author states in the preface that the matter presented in this book is a report of unpublished clinical lectures delivered at the Pennsylvania Hospital, so revised and elaborated as to eliminate the elements of incompleteness of clinical delivery and lack of method necessarily incident to utilizing clinical material.

Coming from a surgeon connected for many years with the Pennsylvania Hospital,—one of the greatest schools of fracture in this country,—we open this book with the expectation of finding a decided addition to our knowledge of fractures, and a teaching which, while up-to-date in all particulars, shall be sufficiently conservative and safe, not only for the surgical specialist, but for the student and general practitioner. In this expectation we have not been disappointed.

The subject-matter of the book is carefully arranged and

the fractures of the various bones of the body are systematically considered. In fact, unlike many books which are based upon clinical lectures, this book is exceedingly well arranged. The introduction deals with general considerations in regard to fractures: the causes of fracture, predisposing and direct; the varieties of fracture; union of fracture; general principles of treatment; and an account of some very interesting original experiments made by the author upon the force required to fracture adult bones, under given conditions. Various transverse, crushing, and tensile strains were applied, and the amount of strain was accurately determined by appropriate testing-machines when fracture was produced. The experiments show what a remarkable strain a bone under certain conditions will endure without fracture. A tensile strain of 1845 pounds failed to break the patella, although it ruptured the quadriceps tendon.

The very important subject of fractures of the lower end of the radius is admirably treated. The picture of the typical deformity in Colles's fracture and the numerous skiagraphs of fractures of the lower end of the radius fully illustrate the subject. In the treatment, the author advises the use of a carefully padded Bond splint and the retention of the fingers by a few turns of the bandage, so that voluntary motion may be avoided. This advice, we think, will be considered sound by surgeons who have had a dispensary practice and have seen the very free use which patients make of the fingers when not controlled by bandage. Under the subject of passive motion, the author advises, in this and other fractures, to make only one complete motion of flexion, of extension, of pronation, and of supination, rather than, as is so often done, a number of incomplete motions which may give more pain to the patient and displace the fragments.

The illustrations of fractures of the leg are all good. We have been especially struck by the series of skiagraphs of oblique fracture, of corkscrew fracture, and of greenstick fracture of the tibia. In the treatment of fracture of the leg, the author says that

the single and simple dressing employed almost universally is that of plaster of Paris. He advises the extension of the dressing at least as far as to the middle third of the thigh, in order to secure complete control of the upper fragment and prevent rotary movements, which "are perhaps the most insidious ones to be dealt with." He calls attention to the prevalent tendency to apply fixed dressings with the foot somewhat extended, which, in case of any rigidity at the ankle-joint, may leave the foot in a position of talipes equinus. The author does not recommend the general use of the ambulatory treatment of fractures of the lower extremity. He says that the cases to which it may be applicable are those to whom confinement to bed proves injurious; and that it is a measure requiring so much skill to insure the avoidance of any mishap that it cannot perhaps be prudently recommended for general use.

The subject of fracture of the patella is very completely and judiciously considered, and the advice in regard to treatment is sound. He draws attention to the fact that efforts to obtain bony or close fibrous union have at times occupied so much attention that sufficient care has not been given to that other important element in the cure, the perfect flexion and extension of the knee-joint. In most cases of fracture of the patella, he considers operation unadvisable. He recommends downward traction of the upper fragment by means of the usual extension apparatus, and straps of rubber adhesive plaster applied to the thigh in an arrangement resembling that of the familiar wicker-work Indian puzzle. In regard to the operative treatment, the author says that it should be reserved for cases in which there is wide separation of fragments, extensive lateral tears of aponeurosis, or the presence of extraneous matter between fragments, simultaneous fractures of both bones, and, as a secondary measure, either after failure of other treatment or after refracture. The open method is the only one to be considered. He recalls the fact that cases with considerable separation of the fragments

may often have exceedingly serviceable legs; perfect motion of the knee-joint, even with marked separation of fragments, being better than close union of the patella with a stiff knee.

The chapter on fractures of the spine is exceedingly good. The author calls attention to the occurrence of complete paralysis after spinal injury without fracture, and refers to a case, which had come under his observation at the Pennsylvania Hospital, of recovery after complete paralysis from "sprain of the cervical spine."

In regard to treatment, he says that in any suspected case of fracture of the spine accompanied by paralysis, in which within forty-eight hours the paralysis shows a tendency to slight improvement and in which no displacement in the line of the spinous processes can be detected, operation should at least be delayed; and in reaching a decision a careful study of the behavior of the paralysis is a more useful guide than are the observations of its primary character. In these hopeless injuries, one of the chief reasons for operating is the hopelessness of obtaining any amelioration of symptoms, or arrest of the direful consequences of the injury by any palliative measures. An illustration is given of the author's spinal rongeur forceps, a very useful instrument for performing laminectomy.

Fractures of the skull are discussed with the thoroughness and clearness characteristic of the rest of the book. In case it is desired to close with new bone a hiatus made by trephining, the author advises the implantation of particles of bone prepared from some of the fragments which have been removed; the particles being reduced to the size of coffee-grounds by the rongeur forceps.

In the final chapter on compound fractures, the treatment is very thoroughly discussed, from the emergency dressing of a compound fracture to the treatment of those refractory cases in which suturing or pegging of the fragments is necessary. An interesting description of the author's method of bone-joining is



given. It consists in making well-fitting scarfs at the site of fracture; boring through both fragments with the drill; cutting a thread in the drill-hole of the upper fragment, and joining by a single ivory screw. The method, so far as the use of the single screw is concerned, is as yet experimental.

We have given sufficient outline of this book to show its character. It will repay perusal by medical student, general practitioner, and surgeon. The advice given in regard to treatment may be followed with the secure feeling that it is sound and conservative, has been tested by wide experience, and has secured the best results which can at present be obtained in these injuries.

The book is very attractive in appearance, printed with large type, well leaded, and a broad margin on excellent paper. The illustrations, which are advantageously placed in the text, are all new and particularly fine, being original half-tones of photographs and skiagraphs, and so well chosen that nearly all the varieties of fracture are represented.

ROBERT G. LE CONTE.

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ANNALS OF SURGERY,

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# GUNSHOT WOUNDS IN THE PHILIPPINO-AMERICAN WAR.

By E. F. ROBINSON, M.D.,

OF KANSAS CITY, MO.,

LATE ACTING ASSISTANT SURGEON, UNITED STATES ARMY.

THIS paper has been prepared from the record of 1596 cases of gunshot wounds admitted to the First Reserve Hospital, Manila, Philippine Islands, during the Philippino-American War, and is supplemented by the personal notes of 462 of these cases occurring during the author's service as operating surgeon. This number is approximately the total of casualties from gunshot wounds up to May 1, 1900, received by the Eighth Army Corps in the pacification of the islands, and exceeds the total number of gunshot wounds in the whole Spanish-American War.

Until within the past few months, all of the sick and wounded were treated in the Manila hospitals, consequently, the opportunity for studying the effect of the modern high-velocity projectile has been unusually great. The statements herein made are from personal observation and actual record of gunshot wounds on the living, and have not been influenced by the opinions of theoretical writers, nor by experimental work on the cadaver. The effort has been made to report facts.

From August 1, 1898, to May 1, 1900, 22,181 patients were received at the First Reserve Hospital in Manila. Only a little over 7 per cent. of this number had gunshot wounds. The hardy character of the American volunteers is well attested by the fact that the percentage of sickness among them was less than that of the regular army; while of the total number of wounded, 59 per cent. were volunteers. It must

be borne in mind, however, that the regular army was just recuperating from the severe Cuban campaign, and was scarcely in fit condition to stand trying service in the tropics. The volunteers, by their own wish, were early kept more on the firing-line, leaving the drudgery of patrol and garrison duty to the regular troops. Both were equally brave, and of both the American people may well be proud.

*Self-Inflicted Wounds.*—In this immense army of 65,000 men there were but fifty-nine cases of intentional self-inflicted gunshot wounds. Of this number but twenty-one were among the volunteers and thirty-eight among the regular troops. In our army cowardice is unusual, yet the fear of an approaching engagement was occasionally so intense among raw recruits that this means was taken of attaining disability. As in the Civil War, the first finger was not infrequently shot away, but by far the greater number of such injuries were the so-called “plunging wounds” of the hands and feet. (One soldier, so great was his dread of an approaching battle, deliberately shot himself through the fleshy part of his thigh, thereby injuring the deep femoral artery so severely that he nearly died of secondary hæmorrhage.) In almost every instance these self-inflicted wounds were said to have been received by the accidental discharge of the man’s own piece while on outpost duty, alone and at night. Almost invariably the wound was in such a position and from such a direction as to make it impossible except through design. Like suicide, this matter of the self-infliction of wounds threatened to become almost epidemic at one time. Colonel Woodhull, Chief Surgeon of the Department, made it the subject of a circular letter to regimental officers. Upon his recommendation, a board was appointed to investigate every case of accidental shooting, and to determine whether or not the wound in question was intentionally inflicted. The number of such wounds appreciably diminished after the publication of this order; yet there were fourteen cases of intentional self-inflicted wounds in the hospital at one time, to such an extent had example prevailed.

*Character of Bullet.*—Of the total number of gunshot wounds received at the Manila hospitals, 223 cases were brought in dead or died within twelve hours of admission, leaving the number treated as 1373. In this number there were but fifty-eight deaths, a mortality of 4.2 per cent. of the cases treated. These cases are classified as follows:

High-velocity projectiles, 718 (Mauser, 625; Krag, 93).

Low-velocity projectiles, 442 (Remington, 381; revolver, 37; Springfield, 16; shell wound, 8).

Character of missile unknown, 182.

All of these wounds, with the exception of possibly 100, were received by our own troops, and at all ranges, from a distance so great that the ball was often found lodged in the tissues to those received from the very muzzle of the gun-barrel; but the majority of wounds were received at comparatively close range, ambush being a frequent method of attack, and in a "close country" the distance between the opposing forces was not great.

*Explosive Effect.*—Theoretical writers have stated that there are two places in the trajectory of the modern bullet in which the "explosive effect" on the tissues will be noted. One within 350 yards, when it is said the rotary and unsteady motion of the bullet lacerates and destroys the tissue surrounding its tract; and the other, in the last portion of the missile's flight, when it again assumes this wobbling, destructive character. But in our experience no instance of this destructive effect upon tissue was noted in the wounds received at extreme range, and in the gunshot wounds at close quarters it was comparatively rare. In our personal record of 462 cases of gunshot wounds, mention is made of the "explosive effect" in but twenty-four cases. Practically, all of these were wounds of the long bones and calvarium. In no case was it noted in the muscles alone, and in but two instances in wounds of solid organs. On the contrary, several gunshot wounds of the liver, spleen, and kidneys received from within this "explosive" zone were entirely without this characteristic. From these facts, we are led to the conclusion that the "explosive

effect" of the modern high-velocity projectile depends chiefly on the character of the tissue struck, and less on velocity. In particularly friable, brittle structures this phenomenon will undoubtedly at times occur in wounds received at close range, but its prevalence is by no means as common as recent military literature would lead us to believe.

*Comparison of Wounds inflicted by the New and the Old Models of Projectiles.*—The wounds of the Krag and Mauser are indistinguishable, both in appearance and in results. Of Springfield and revolver wounds there were comparatively few. Only eight shell wounds were seen. These occurred among our own men, and beyond severe lacerations presented nothing characteristic. The natives struck by artillery fire were usually killed, or treated in the native hospitals, and so no record of these wounds is at hand. There was a large percentage of Remington wounds. The Remington bullet wound is almost invariably infected, but particularly so when fired by black powder. The insurgents reloaded many of their shells with smokeless powder, so that an opportunity was thus afforded for comparison. Incidentally it may be mentioned that so scarce did powder of any sort become that the natives began to use the heads of matches as an explosive. From a certain Japanese match, in general use in the Philippines, the head was clipped off. Two small boxes thus supplied a smokeless powder for one and one-half shell. Experiments by an artillery officer demonstrated the fact that with this force eight inches more penetration was secured than with the Krag-Jorgensen cartridge. It is needless to add that as soon as the fact became known, matches were made contraband of war, and gunshot wounds from this peculiar explosive ceased. The difference between the wounds of the reloaded shells and those of the old low-velocity charge was not very marked. The destruction of tissue was somewhat greater, and infection was more certain in wounds from the high explosive. The character of the bullet itself is a most important factor in the introduction of infection. The fact that wounds from the "soft-nosed" or Dumdum Mauser bullet are also very prone to suppurate

would tend to support this belief. The ricocheted or spent Mauser bullet from which the metal jacket has been displaced (before or at the time of impact) will almost invariably cause an infected wound.

The aseptic properties, then, of the modern high-velocity projectile, we are led to believe, is brought about, first, by the hard, smooth character of the bullet, which bruises and lacerates the tissue to the minimum extent, and does not carry foreign substances (or minute infection) into the wound. Second, by the velocity of the projectile, whereby in its flight it is rendered sterile. Third, by the early application of an antiseptic dressing on the field.

*First Aid.*—The importance of this method of treatment cannot be overestimated. The remarkable results reported obtained in modern gunshot wounds are due, without doubt, chiefly to the consistent and general application of the principles of antiseptic surgery. Every soldier in the Philippines habitually carries with him a "first-aid package." The men have come to realize the importance of this, and will not be without them. Wrapped in a piece of oiled silk, these little packets of sterile gauze take up no room, and are now as much a part of the soldier's equipment as his canteen.

*Flesh Wounds.*—Wounds of modern high-velocity projectiles uncomplicated by visceral lesion are almost invariably aseptic. It not infrequently happens, however, that a slight infection occurs at the wound of exit; but this is generally very superficial, being confined to the blood-clot and disintegrated tissue in the centre of the wound, and rarely extends. The wound of entrance is smaller and is attended with but slight destruction of tissue. Infection rarely occurs there, the wound healing under the primary dressing.

*Gunshot Wounds of Bone.*—Gunshot wounds of bone inflicted by Mauser and Krag, in which there is no "explosive effect," can be treated on the same principles as any compound comminuted fracture. A very large percentage of them will heal under simple antiseptic treatment and that appropriate to the fracture. In these cases it is better to attempt

to get primary skin union of the bullet wound, for the most marked comminution will be often repaired completely. If a small amount of carious bone results, it can be removed later with equal safety, and generally with much less loss of bone tissue. If marked infection occurs, the wound can be laid open, fragments of bone removed, and free drainage provided. Usually such wounds are perforating, but it not infrequently happens that a Mauser bullet lodges in the tissues. Many of these were allowed to remain, and the wound healed primarily. As a general proposition, it is better in these cases to remove the bullet, as the result can never be absolutely secure. If, on the other hand, the wound is from a Remington or revolver, it is always best to at once lay it open, remove all loose fragments and foreign bodies with the forceps or curette, and drain or pack the cavity. The cases in which infection, generally extensive, did not occur were extremely rare. In sixty-three cases of high-velocity gunshot wounds of long bones, in which careful personal records were kept, there were but twelve infected and fifty-one aseptic cases, or over 80 per cent. clean wounds; while out of twenty-seven Remington wounds of the bones of the extremities, twenty-three were infected, only four aseptic, *i.e.*, 14 per cent.

*Wounds of Lungs.*—Probably no better indication of the aseptic character of the modern gunshot wound can be had than a reference to the record of penetrating gunshot wounds of the lungs. There were received at the First Reserve Hospital seventy-eight cases. Of these ten were brought in dead or died within twenty-four hours of admission, thus leaving sixty-eight cases treated at this hospital. Of this number forty-four were known to be Mauser or Krag wounds and twenty-four Remington or revolver. Only five of the forty-four high-velocity wounds were infected, *i.e.*, 88 per cent. were aseptic. Of the twenty-four low-velocity wounds (Remington and revolver) five were infected and died, and six were infected and later sent to the United States for treatment, and the cases thus lost sight of. Thus it is seen that almost 50 per cent. of the low-velocity gunshot wounds of chest became infected,

while only about 12 per cent. of the wounds from the new modern projectile gave serious trouble.

The treatment of these cases consisted simply in an occlusive antiseptic dressing. Only in those cases in which the hæmorrhage was extensive was the pleura aspirated. An individual report of these cases is not given, as they would only prove a matter of repetition in detailing the wounds of entrance and exit, as it was unnecessary to make any further notes on the cases. They can be referred to by official number in the records of the First and Second Reserve Hospitals in Manila. One case is, however, of sufficient interest to warrant its publication.

"Case 10,024.—Sergeant-Major, Thirty-sixth U. S. V., Infantry, February 11, 1900.

"*Attempted suicide. Gunshot wound, left chest, .45 calibre.* Wound of entrance one-half inch to left of sternum in third interspace. Badly powder-burned. Wound of exit spine of scapula, one-half inch external to inner border of scapula. Perforating chest, lung, and probably pericardium. Ball must have grazed heart or passed between great vessels at base. Organ in normal position. Shock very great on admission; no pulse. It was thought the man was dying, but under strong stimulation patient finally reacted, so that twelve hours later pulse was 108 strong, temperature 99° F., free hæmorrhage from wounds, respiration rapid and labored.

"February 17, 1900. Continues to improve, but temperature 103°, pulse 120, respiration 44. 550 cubic centimetres dark blood removed by aspiration of left pleura.

"February 19. Comfortable; temperature 98°, pulse 96, respiration 32. 'Feels good.'

"February 26. Has been up for several days. Out of danger.

"February 28. Wound almost healed. Patient sent to Convalescent Hospital on Corregidor Island."

The explanation in this case lies doubtless in the well-known property which arteries have in resisting gunshot wounds. In this case the bullet must have either grazed the



auricles or passed between the great vessels at the base of the heart. The organ was in its normal position, and no other explanation seems possible.

*Injuries to Blood-Vessels.*—Contrary to the prediction expressed when the modern high-velocity projectile was first introduced, primary hæmorrhage from gunshot wound is uncommon; in fact, no more frequent to-day than it was in the Civil War. Despite the velocity of the modern bullet, blood-vessels continue to escape injury in the same remarkable manner, being pushed aside rather than severed by the rapidly moving bullet. Our records show some remarkable instances. The following case will show this tendency of blood-vessels to escape injury:

“Case 2540.—Private, Company I, Twenty-fourth Infantry. Wounded at Aryat, P. I., October 12, 1899.

“*Gunshot wound, neck, Mauser.* Wound of entrance one and one-half inches below mastoid, left side. Wound of exit one and one-half inches below angle inferior maxilla, right side, just grazing bone. Bullet passed between large vessels of neck, pushing them aside without injury. Union primary. Slight temperature for four or five days. Recovery complete.”

There were but two cases of severe secondary hæmorrhage from gunshot wounds. One case, in which the brachial artery was completely severed, required amputation.

*Aneurism.*—Three cases of aneurism are recorded from gunshot wounds. Ligation of the main trunk in each case was performed.

“Case 8046.—*Ligation of femoral in Hunter's canal for popliteal aneurism* with complete establishment of collateral circulation. (Robinson.)

“Private, Company H, Seventeenth Infantry, in action, Angeles, October 16, 1899. Gunshot wound, Mauser, left thigh. Wound of entrance four inches above knee-joint, posterior external aspect. Ball passed downward and forward, emerging at wound of exit, six inches above left internal malleolus. The note says ‘slight’ wound, healed by primary union. Three weeks

later an aneurism about the size of an orange developed in popliteal space. Extension became painful, and the leg was consequently kept continuously in a semiflexed position. Under ether anaesthesia, an incision was made below apex of Scarpa's triangle. The sartorius muscle was displaced to inner side, and Hunter's canal was opened for about one inch. The sheath of the artery was incised and a silk ligature passed from within outward. No small vessels required ligation. Wound closed by primary union. Pulsation in the aneurism immediately ceased. By the fourth day collateral circulation was well established. From slight pressure on the leg while the circulation was thus impaired, two small gangrenous spots developed about the external malleolus, but these rapidly healed. Recovery was complete, with a useful leg."

"Case 7005.—*Subclavian aneurism. Ligation in second portion.*

"The subclavian was successfully ligated in the second portion for gunshot wound, aneurism, by Majors Crosby and Kendall, Surgeons, U. S. A.

"Private, Company D, Twenty-first Infantry. Gunshot wound, Mauser, severe, penetrating left chest. Wound of entrance at upper part of left chest, just at juncture of middle and inner third of clavicle, bone not broken. Left subclavian (record says 'left clavicular') vein severed and walls of artery damaged. No exit. Received in action at Calamba, October 3, 1899. October 26, 1899, subclavian artery ligated at 'external end of second part, for large aneurism. Primary union.' Case transferred to United States on army transport 'Rio Janeiro,' November 12, 1899."

Unfortunately, there are no further notes on the case. Personally, I saw the patient, however, many times, although I did not witness the operation. The aneurism was of unusual size and rapidly increasing. It occupied the whole axillary and subclavian space, and gave great pain and discomfort. The whole shoulder was swollen and discolored and infiltrated with blood, and seemed to pulsate with the tumor. The operation was apparently a complete success. A point noted in this case, that was also pronounced in the other successful ligations, was

the peculiar loss of sensation in the limb after ligation. This numb and tingling sensation continued for weeks after circulation had been re-established. In this case the radial pulse never returned, but circulation was complete.

“Case 9232.—*Ligation of external iliac artery, for dissecting aneurism.*

“For a gunshot wound causing a large dissecting aneurism of the common femoral, the external iliac was ligated. Collateral circulation was not established, however, and amputation at the hip-joint became necessary. The patient ultimately recovered. (Kendall and Robinson.)

“January 6, 1900. First Lieutenant, Thirty-sixth U. S. V., Infantry. Gunshot wound, right thigh. Wound of entrance four inches below Poupart's ligament and one-quarter of an inch external to femoral artery. Wound of exit one and one-half inches external to and one-half inch below tuberosity of ischium. Aneurism extended from one inch below wound to above Poupart's ligament, where thrill could be felt by deep pressure. Bruit and thrill marked. Patient could not use the leg at all on account of pain. No sensation in foot and ankle, numbness extended up to knee. Aneurism extended too high up for compression. It was at first decided to place a provisional ligature below Poupart's ligament, but the aneurism was found to have extended two inches or more above this point; consequently it was necessary to place the ligature higher up. A long incision (four or five inches) was made one inch above Poupart's, extending from near the pubis to the anterior superior spine of the ilium. Upon dissecting down carefully and stripping back the peritoneum, it was found that the aneurism had extended up between the layers of the artery in a fusiform manner, making it necessary to place the ligature more than two inches above Poupart's ligament. In order to do this successfully and avoid the danger of rupture, the peritoneum was opened. The artery was found just at the brim of the pelvis, and ligated with strong braided silk, the aneurism-needle being passed from within outward. Upon tightening the ligature, pulsation in the aneurism ceased. Wound was closed without drainage. Collateral circulation, however, was not established; gangrene developed, and on the fifth day it became necessary to amputate at hip-joint. Patient ultimately recovered.”

*Gunshot Wounds of Knee-Joint.*—Even a better record as far as asepsis is concerned was made in gunshot wounds of the knee-joint. Of eighteen Mauser wounds, only one was infected. Two Mauser bullets lodged in the joint, and as they produced no symptoms, were allowed to remain. In the medical and surgical history of the Civil War it is stated that 60.6 per cent. of gunshot wounds of knee-joint were fatal. With the exception of the one case above mentioned, whose ultimate history is unknown, there is not a single fatality in our records from such an injury, while 51 per cent. of amputations for similar injuries in the Civil War died. How strangely do our opinions change! In 1865 it was stated that “every knee-joint fractured by a ball should be amputated, and the quicker the better,” while to-day we amputate only as a last resort. However, the same surgical principle applies to-day as it did then. An *infected* wound of the knee-joint demands amputation at once. Our own record of Remington wounds supports this old opinion of early amputation. Five cases of wounds of this joint resulted in septic poisoning. In three of these cases (two Remington and one Mauser) death would undoubtedly have resulted had amputation not been performed. One compound fracture of the knee-joint, infected, was treated on conservative lines, but, despite the freest drainage and constant surgical attention, died of septicæmia. Unfortunately, one case of septic Remington wound was transferred to the United States before convalescence was established, and the ultimate history of the case was not known.

“Case 8914.—November 20, 1899. Corporal, Company E, Fourth Infantry.

“*Gunshot wound, Remington, left knee, with longitudinal fracture of patella.* Ball passed to inner side, lodging in subcutaneous tissue, two and one-half inches from entrance. Ball extracted on field. Wound infected on admission, November 23, 1899. Temperature, hectic, 99° to 103° F.; pulse irregular and intermittent. Capsule of joint swollen and full of fetid pus, extending in pockets up flexor muscles of thigh. Immediate amputation at lower third of thigh; ether. Circular am-

putation selected as incurring less hæmorrhage and more rapid. Man in septic condition, and one quart of normal salt solution thrown into veins while on the table, besides a pint by hypodermoclysis. Main artery ligated with silk, others with catgut. Retaining sutures of silver wire were placed far back from edge of incision, through the skin and muscular flaps, and the wound thus approximated by fastening the wire to pads of iodoform gauze, after the manner of Wölfler. Skin sutures of silkworm gut, with drainage. Man off the table in good condition, and made a rapid recovery."

"Case 7175.—Private, Company G, Fourteenth Infantry. November 14, 1899.

*"Amputation femur (lower third) for infected compound comminuted fracture into knee-joint, result of gunshot wound; Remington. Wound of entrance two inches below right knee, shattering fibula and tibia into joint. An effort was made to save leg, although wound infected and three inches of bone had been previously removed. But under free drainage and constant attention, caries extended and no union took place. Amputation, ether. Anteroposterior flaps. Femur removed two inches above condyles. Wound closed. Drainage for forty-eight hours, when removed. Flaps united per prima. 'Ideal stump.'"*

"Case 4365.—Private, Company C, Twenty-first Infantry. *Amputation middle thigh for gunshot wound of knee-joint. Osteomyelitis and arthritis.*

"Note on admission to hospital, July 21, 1899: Gunshot wound left knee-joint; Mauser, 'explosive effect.' Wound of entrance one inch to outer side lower border of patella. Wound of exit, inner side, on level with end of femur; severe. Action, morning, July 17, 1899. For nearly four months every effort had been made to save the leg.

"November 30, 1899. An examination revealed an extensive arthritis and osteomyelitis, and, as the patient was constantly growing weaker, amputation was decided upon. However, an incision was made first for a resection of the knee-joint. The bones and articulating surfaces were found so badly involved, and two abscess cavities, concealed, were found well up the thigh on the flexor muscles, that amputation in the middle of the thigh was deemed the only means of saving life. Anteroposterior flaps were made from without inward. Great difficulty

was experienced in tying vessels, as the arterial walls were diseased, and many had to be repeatedly ligated. It was necessary to tie the main artery and vein three inches higher up on this account. Deep silver-wire sutures, after the manner of Wölfler, were again used, together with drainage. The wound suppurated slightly, but recovery was complete, with a useful stump."

The following case, while not a gunshot wound, was a compound fracture into knee-joint, and hence comes under same category of treatment. The case is reported because it illustrates the necessity of early amputation in cases of infected wounds of the knee-joint. Amputation was not performed, and death resulted. If the operation had been performed early, it is believed the man would have lived.

"Case 10,738.—*Compound fracture into ankle and knee-joint.*

"Native Philippino, about thirty-five years of age; caught in a stone-crusher. Admitted February 19, 1900. His wounds were treated antiseptically, and the injured ankle healed without incident. The knee-joint, however, became infected. However, the patient's condition remained very fair, and it was decided to attempt to save the leg. On three different occasions he was given a general anæsthetic and the joint carefully opened with continuous drainage. The joint surfaces were curetted and an erosion of the articulating surface finally done. The joint was immobilized, nourishing foods and free stimulation were given, but the patient grew continually worse, and died twelve days later of septicæmia."

*Major Amputations for Gunshot Wounds.*—As the direct result of gunshot wounds, there were twelve major amputations performed. Only three of these were primary, the remaining nine were amputated after every effort had been made to save the limb. One amputation (primary) was done at knee-joint for severe gunshot wound shattering the lower leg, and one at middle of calf for infected gunshot wound of foot. There were four amputations at the shoulder-joint. One was primary for severe laceration and fracture, one for injury to the brachial artery, and two were for severe infections, in which

amputation was resorted to as a last resort to save life. Three of these operations were performed by Major Crosby. Incision "en racquet" was used in all but the latter case, in which the head of humerus was not enucleated, a high circular amputation being performed. One of these cases died of empyema later, and the other recovered.

*Hip-Joint Amputation.*—There were only three deaths from amputation, and two of these were amputations at hip-joint. Three such operations were performed; one recovered.

Case 9232 was of peculiar interest, as the operation was performed for gangrene of the leg following ligation of the external iliac artery. The patient, a first lieutenant in the Thirty-sixth U. S. V. Infantry, had been struck in the thigh, high up in Scarpa's triangle, by a Mauser bullet. A large dissecting aneurism developed, which not only gave great pain, but threatened to rupture. An effort was made to ligate the artery extraperitoneally from an incision parallel to Poupart's ligament, but it was found the aneurismal sac had dissected up to such an extent that it was necessary to open the peritoneum in order to place the ligature high enough up about sound tissue. A slight effort seemed to have been made in the upper part of the thigh at collateral circulation, but on the fifth day gangrene unmistakably developed and the limb was amputated. As in the other operations, Wyeth's method of hæmostasis was used in this case to control hæmorrhage from the branches of the internal iliac and the dilated vessels of the external iliac, in which an effort had been made to establish a return circulation. Patient recovered.

The other two cases died. One was a native, sixty-two years old, and the other an infantry captain about thirty-five years old, whose gunshot wound became infected by gas bacillus (*bacillus aërogenes capsulatus*) prior to admission. Operation was at once performed, but without avail.

*Excision of Elbow-Joint.*—Two resections of the elbow were done for gunshot wounds with perfect results, and one excision of the hip-joint.

"Case 10,237.—*Excision of elbow-joint.* Private, Company H, Forty-third Infantry. Gunshot wound, Krag; accidental at

short range, badly shattering left elbow-joint: 'Explosive effect.' Ball entered tip of olecranon process, exit one and one-half inches anterior to internal condyle. Joint completely destroyed and tissues torn and full of powder and dirt. Ulnar nerve destroyed by bullet for one and one-half inches (nothing remaining but a fibrous cord). The shattered end of humerus and extremities of ulna and radius were removed. The ulnar nerve was resected. Primary union. Excision was most successful, as complete power of flexion and extension of forearm resulted."

"Case 8416.—*Excision of elbow.* October 8, 1899. Private, Company L, Ninth Infantry. Was struck by Mauser bullet over olecranon, October 3, 1899, and elbow-joint badly shattered. On admission to First Reserve Hospital, four weeks later, wound infected and much carious bone.

"Operation, ether. Incision along outer aspect of arm, about five inches long. Ulnar nerve displaced and humerus and articulating surfaces of ulna and radius removed with saw; carious fragments with curette; counter-drainage. Internal angular splint for ten days, when simple dressing applied. Primary union, with a useful joint."

"Case, Philippino prisoner, about twenty-four years of age. *Excision of head of femur for gunshot wound, Krag.*

"Wound of entrance, right buttock, five inches internal to right great trochanter on level with tip of same posterior surface. Wound of exit, right side base of penis, infected. Under ether, adhesions broken up and abscess opened. Man developed all symptoms of hip-joint disease. Pain constant and excessive. Leg semiflexed, adducted, and rotated inward. Another abscess formed in buttock. Patient much emaciated.

"March 8, 1900. A curvilinear (S-shaped) incision was made just to outer side of great trochanter, capsule of joint opened, teres ligament incised, and head of bone enucleated and removed with chain-saw. The whole articulating surface was much diseased and carious. The ball had passed directly through acetabulum, shattering the innominate bone and displacing fragments of the joint more than one and one-half inches to the lower side. A large abscess cavity was evacuated. Irrigation was instituted and the wound closed with sutures of silkworm gut. Sand bags with light extension kept the patient quiet. Rapid improvement occurred."



*Resection of Long Bones.*—Resection of the shaft of long bones (the humerus, radius, ulna, and fibula) was performed in several instances. Primary wiring can seldom be resorted to, owing to the usual extent of the fracture and the inability to bring the fragments into proper apposition. In these cases the destruction of the soft tissues is also very great and infection is prone to occur. This happened in one case, but complete union resulted. The majority of our cases were those in which the so-called “explosive effect” was noted.

The following cases are reported, as they are types of injuries from gunshot wounds, and represent in kind and extent the difficulties that are met and results that are to be attained by the military surgeon.

“Case 1304.—S. R. *Resection shaft of humerus.* Lieutenant, Twenty-third U. S. Infantry. Gunshot wound left upper arm, Remington, badly shattering humerus. Patient had been treated for five weeks in hospital. Long-continued suppuration, much carious bone removed at an early operation.

“Operation, August 19, 1899, ether. The incision longitudinally extended along posterior and outer surface from one inch above deltoid tubercle to one and one-half inches below olecranon. The shaft of humerus was found carious for three inches, the lower end of upper fragment soft and necrosed, the upper portion white and hard. No union had taken place, the ends of the bone being simply embedded in a mass of inflammatory tissue. The upper end of the lower fragment was found also necrosed. The fracture had extended into the joint, which had become ankylosed. An inch of the lower fragment and three inches of the upper fragment were removed with the saw, and the necrotic soft parts curetted. As far as possible, an effort was made to save the periosteum, but much of this had already been destroyed by the inflammatory process. Owing to the removal of so much of the shaft of the humerus (four inches), the bones could not be brought together. The wound was approximated, through-and-through drainage was established, and a splint applied. Healing occurred without incident. A ‘flail arm’ resulted, but this was rather fortunate than otherwise, as the elbow-joint attached to the small lower fragment was ankylosed. The low

position of the missing portion of the shaft of the humerus in reality enabled a new joint to be formed just above the elbow-joint proper, and by the action of the biceps and triceps muscles very fair flexion and extension were obtained. In fact, a better arm resulted than if the bones had united."

"Case 8365.—*Wiring for gunshot wound of humerus.* Hospital steward, H. C., Seventeenth Infantry. Gunshot wound, upper third humerus. Ball (Remington) entered at deltoid tubercle and was removed by simple incision from under right scapula. Humerus shattered and musculospiral nerve injured, so that extensor paralysis resulted. Case seen four weeks after receipt of injury; wound not yet healed, carious bone evident to probe, no union. Ends of bone excised and fragments brought together with silver wire. Arm fixed in plaster with fenestration for dressing the wound. Notwithstanding slight suppuration, wound rapidly healed. At end of three weeks silver wire removed. By fifth week bony union was complete."

"Case 9687.—*Resection of radius.* Private, Company C, Thirtieth Infantry. Was struck by lead slugs fired from a Remington rifle at short range and the forearm badly shattered. Two inches of the radius were completely disintegrated, but ulna escaped. This portion of radius it became necessary to remove. Union occurred between the fragments of the radius to the ulna, but with very little angular deformity. A very useful arm resulted."

*Resection of Tarsus.*—Gunshot wounds of the smaller joints were proportionately as free from infection as those of the knee-joint, with the possible exception of those of the tarsus. Here the chance of primary infection is obviously greater, and the difficulties of maintaining a "clean" wound are excessive. In three cases a total or partial excision of the bones of the tarsus was performed. Recovery resulted in each instance, with a foot that would bear the body weight. However, partial bony ankylosis resulted in each instance, and for months the foot was tender and painful. The return of usefulness to the member was long delayed. In fact, it remains a very grave question to-day whether this operation is justifiable. It is always attended with risks, and means weeks or months of

suffering, with at the end only a questionable result. Amputation in these cases is attended with much less danger to life than resection, the patient is almost immediately convalescent, and an artificial limb can be worn with equal usefulness and less deformity. This opinion applies particularly to severe gunshot wounds of the tarsus which have become infected. The author does not wish to advocate amputation in all gunshot wounds of this joint, but only in those cases in which the destruction of bone has been sufficient to indicate a resection. In these he affirms amputation is preferable.

*Gunshot Wounds of the Face.*—The gunshot wounds of the head were quite remarkable. There were many cases of wounds of the face and head not involving the calvarium that recovered. In fact, most markedly was it demonstrated to what an extent the lower portion of the head may be injured without serious results. A captain of infantry was struck by a Mauser one and one-half inches internal and below the malar bone, the ball emerged just to the left of the spine of the axis. He was out of the hospital in ten days. With the exception of a slight loss of sensation in the cutaneous nerves of that side of the face, there was no after-effect.

During a moment of temporary insanity, an officer of the Ninth Infantry placed a .38-calibre revolver beneath his chin and fired. The ball passed through the floor of the mouth, the tongue, hard palate, and out at a point one inch above the nasal eminence. With the exception of the opening in the hard palate, which perished, the injury was slight. Numerous similar wounds of the face were noted, but in almost every instance they healed primarily, or with but superficial suppuration.

*Gunshot Wounds of the Brain.*—There are three cases on our records of severe penetrating gunshot wounds of the brain which recovered, and two cases lived also for a period sufficiently remarkable to warrant their publication. They are reported in detail.

“Case 3229.—Private, First Montana, U. S. V. Gunshot wound, Mauser. Wound of entrance one inch back and one inch

above left external angular process of frontal bone, passing transversely and slightly downward through the head. Wound of exit two inches back of and on a line with 'outer angle right eye.' Sight totally gone in right eye, three-fourths absent in left. United States for treatment. On admission man was dazed, but sufficiently conscious to answer questions about his sight. Coma soon developed with all symptoms of encephalitis. After living three weeks in a semiconscious condition, his symptoms gradually subsided, and by the fourth week his sight in left eye had almost completely returned, and the man was out of danger. The sight in the right eye was totally destroyed. His only treatment consisted in nourishing foods and stimulation. Locally, the wound had only been cleansed and a simple antiseptic dressing applied. From the position of the wound, it is evident the ball passed directly through the frontal lobes of the brain, severing probably the tract of the right optic nerve."

"Case 3807.—March 25, 1899. Private, Company F, Second Oregon. Gunshot wound, head, Remington.

"Wound of entrance two and one-half inches above right eye, in centre of frontal eminence. Wound of exit two inches directly posterior, fracturing skull and penetrating brain superficially. A furrow was made along the brain substance about three-fourths of an inch deep. There was superficial infection of skin wound. Patient made an uneventful recovery, and was transferred to 'Quarters' May 27, 1899. This case also demonstrates the extent the brain may be injured without a fatal result. Unfortunately, complete notes of this case are not at hand."

"Case 5379.—May 5, 1899. Corporal, Company C, Twentieth Kansas. Gunshot wound, Mauser. Ball entered head two and one-half inches above and one-half inch to left of left external angular process of frontal bone, passing directly through head from left to right. Exit same measurements on right side. Unfortunately, a detailed report of this case is not at hand. The patient recovered, however, and June 9, 1899, was transferred to hospital ship 'Relief.' In this case there was absolutely no mental impairment from the wound. Upon his return to civil life he resumed his ordinary duties and was attending a business college nine months later, when he died from an acute disease."

As has been aptly remarked by Clinton Dent, surgeon with the British army in South Africa, "The experience of

gunshot wounds of the head in this war (Boer) almost appears to render the use of the frontal lobes of the brain questionable."

The great extent of injury the brain may suffer without an immediately fatal issue is well shown by two cases of gunshot wounds. Nearly a whole lateral hemisphere in each case was completely destroyed, yet each lived exactly twelve days from the receipt of injury.

*Spinal Cord.*—Every case but one of gunshot wounds of the spinal cord died of cerebrospinal meningitis in from three to five days. Our personal records show five cases. The case still living four months after injury had developed complete hemiplegia with trophic bed-sores and marked muscular atrophy. Ultimate death was the only possible result. The wounds in these cases were in every instance apparently aseptic, from an external examination. Unfortunately, no bacteriological cultures were made from the spinal cord or brain after death, but from the appearance of the wound it is inferred they would have proven negative. Shock was not pronounced. Suddenly, within twelve to twenty-four hours of the receipt of injury, all the symptoms of a severe meningitis developed. Pain was excessive. Hyperæsthesia of the whole body was pronounced. An area of exquisite tenderness and "girdle pain" marked the lower border of sensation, with complete paralysis below the seat of injury. The temperature was remarkably high, often remaining so for several hours after death. From an observation of these cases we are led to believe that infection had not taken place, but that the simple traumatism effected by the bullet set up a reactionary inflammation of the cord and brain sufficient to cause death. Involvement of the heat centre early seems to explain the remarkable temperature.

*Resection of Nerves.*—Gunshot wounds of nerves were not uncommon. The musculospiral and ulnar were most frequently injured. Complete paralysis resulted occasionally in cases in which dissection showed the nerve itself had not been severed, but only apparently slightly injured by the passing

high-velocity bullet. The severe local shock inflicted upon adjacent tissue doubtless explains this condition.

Two cases of resection of nerves for gunshot wounds were performed,—one primary, within twenty-four hours of receipt of injury, and the other secondary, six weeks after the wound was inflicted. In the former case, No. 10,237, the ulnar nerve had been destroyed for one and one-half inches by the discharge of a Krag at short range. The injured portion (one and one-half inches) was excised and the ends brought together with fine silk,—one through-and-through suture and three others uniting the nerve sheath. Excision of the elbow-joint was performed at the same time. The result was surprisingly good. At the end of two weeks motion had returned and sensation in all but a small area of the outer side of the little finger. Even here sensation was not completely lost.

The case of secondary suture of the musculospiral nerve, No. 10,289, was not a success two months after operation. At this date the case was lost sight of. The injury was the result of a Mauser wound through the muscles of the upper arm, severing completely the nerve. At operation the scar tissue was removed and the nerve ends brought together with fine silk. The wound closed by primary union. However, but little was hoped for in this case, as atrophy of the muscles of the forearm was marked before the operation was undertaken.

*Gunshot Wounds of Abdomen.*—Our own military experience with the modern high-velocity projectile convinces us conclusively that gunshot wounds of the abdomen should not be operated upon in time of war. In civil life, where the wound is apt to be received after a hearty meal, when the patient can be immediately surrounded by every facility for modern aseptic procedure, his chance is doubtless better with operation. In military practice, however, delay must often supervene before proper surgical surroundings can be secured to warrant safe work. Generally it is from six to twelve hours or more before these cases can be brought to the operating table, and at that time infection, if it is to occur, has already taken place, or if not, the danger is past. Exhaustion after a long ambulance ride or transfer from the field place the

patient in a condition not encouraging, at least, to the successful issue of a prolonged operation. The shock attendant upon such an injury has already reduced his resistance materially, and the ethical consideration (by no means a small one) of the greatest good to the greatest number, all tend to convince the military surgeon that in time of war, at least, abdominal section for modern gunshot wounds should rarely, if ever, be performed. Statistics bear out this opinion.

In our records there are forty-five cases of penetrating gunshot wounds of abdomen. Eight of these were brought in dead or died in twenty-four hours, before any operative interference was possible. Of the thirty-seven remaining, thirty-four were from the Mauser or Krag. Of these, thirty were treated without operation; twenty recovered and ten died, a percentage of  $66\frac{2}{3}$  per cent. recovery. These wounds were received at all ranges and in all parts of the abdomen. The liver, kidneys, and bladder were repeatedly punctured, and the cases recovered as if from a simple wound, with the least possible inconvenience. Death from hæmorrhage usually followed wounds of the spleen. Our record contains but one bullet wound of this organ that recovered. Of the four cases operated upon, three died and one recovered. This latter case demonstrates conclusively the point mentioned so frequently by Col. Nicholas Senn, that a Mauser or Krag bullet may pass directly through the abdomen (above the umbilicus) without causing great damage.

In case No. 8780, a private in the Thirty-seventh Infantry was struck by a ricochetted Krag while at target practice. The ball entered two inches above the border of the ribs in the left mammary line, and taking a downward and backward course lodged in the left loin. As the man was received at the hospital within an hour after the injury, contrary to the usual course, operation was decided upon. Under antiseptic precautions, the abdomen was opened in the median line and a large amount of free blood and clots removed. It was found that the ball had passed through the omentum and mesentery, but that the intestines had entirely escaped injury. The bleeding omental and mesenteric arteries were tied and the abdomen

flushed out with normal salt solution. Primary union resulted.

The fact that men in battle are apt to have their alimentary tract empty when wounded is an important factor in lessening the danger of infection. Often a small punctured wound of an empty intestine will heal primarily or become occluded within twelve hours. Three gunshot wounds of abdomen were from Remington bullets. One of these recovered without operation, but developed a double fecal fistula. One died, and one was operated on, but succumbed to shock in twelve hours.

There are two important factors that militate against aseptic surgery in the tropics. (1) The greater tendency here for infection, and (2) the general poor health of the patient, whereby his reactionary powers are lowered. With reference to the first; the country is hot and moist, the air and the dust of the streets and houses are full of vegetable and animal life. Indeed, to such an extent do these influences prevail that the greatest difficulty is encountered, even in the Manila laboratories, in securing freedom from infection. In fact, it is almost impossible to work out plate cultures, so freely are they contaminated. Surgical material and dressings have to be repeatedly sterilized, much more often than in the United States, to guarantee asepsis. Here truly infection is in the air. Among the natives, as well as the soldiers, the slightest abrasion is prone to suppurate. Persistent ulcers are daily seen, and phagedena is common. If kept aseptic, there is no specific influence in a tropical country to prevent wounds healing. The slowness in this respect is due, apparently, to the relaxed and reduced condition of the patient. Men who have lived for months in a tropical country are below par. All of them have lost weight, many of them are reduced from previous illness or wasting disease. Dengue, dysentery, typhoid and malarial fevers have all exerted their malevolent influence. Resistance is lower and wound repair is consequently less rapid. Often simply the depression incident upon taking an anæsthetic was sufficient to bring on an attack of malaria in one apparently free from the disease. Indeed, this phenomenon was so often noted that quinine was given almost as a routine treatment;



with marked benefit not only to the patient but also to the nerves of the operator. Continuous temperatures were seen after slight injuries. Dengue, dysentery, and phthisis supervened without assignable cause. Pneumonia was not a frequent complication. Shock was at times pronounced from slight causes, apparently, more severe than in a colder climate. Yet with all this, the results accomplished compared most favorably with those of a temperate climate. The application of the principles of modern surgery was only more difficult in this tropical campaign.

#### CONCLUSIONS.

(1) The modern gunshot wound is generally aseptic, and should be treated on this supposition.

(2) Asepsis is due chiefly to character of bullet, and early application of first-aid dressing, and in a minor degree to the velocity of the projectile.

(3) Primary hæmorrhage from modern gunshot wounds is exceedingly rare, the blood-vessels being displaced rather than cut by the rapidly moving projectile.

(4) The "explosive effect" of the modern bullet is much less common than recent military literature would indicate. This peculiar destructive effect is produced by the character of the tissue struck, as well as by the great velocity of the bullet.

(5) Gunshot wounds of chest are rarely infected. Simple antiseptic treatment, with aspiration of pleura in cases of severe hæmorrhage, is all that is necessary.

(6) Gunshot wounds of knee-joint are usually aseptic, but if infected, demand immediate amputation to save life.

(7) Excision of elbow is always a justifiable operation in severe shattering or infection of that joint. Resection of bones of other joints is rarely necessary, erosion or amputation being preferable.

(8) Injuries of nerves from gunshot wounds can often be benefited by operative interference or resection.

(9) In modern military surgery, abdominal section for gunshot wound is not justifiable; the patient's best chance of recovery lies in conservative treatment without operation.

# SARCOMA OF THE UTERUS.

By VAN BUREN KNOTT, M.D.,

OF SIOUX CITY, IOWA.

THE conclusions reached in this paper are based upon a study of 118 cases of sarcoma of the uterus which the writer has been able to collect from the literature of the past ten years. It is believed that every case reported during that time is included, and no case has been accepted unless the diagnosis has been verified microscopically.

The very excellent monographs by J. Whitbridge Williams<sup>1</sup> and W. Roger Williams<sup>2</sup> have been of great assistance to me and will be freely quoted.

The first case of uterine sarcoma reported was that of C. Mayer, in 1860, Virchow making the microscopical report. In 1871 Keegar read a paper describing nine cases, which included the total number reported at that time. In the years immediately following more cases were reported by German surgeons and a few in other countries, until in 1894 Williams was able to collect 144 cases of all varieties.

For convenience, we may divide uterine sarcomata into three groups:

- (1) Those originating in the mucosa.
- (2) Those originating in the parenchyma.
- (3) Those springing from the cervix.

The first class, or those sarcomata which primarily arise from the mucosa of the corpus uteri, has usually been considered the most frequent variety of uterine sarcomata. Of the 144 cases reported by Williams, forty-four, or nearly one-third, belonged to this class.

However, in attempting to classify these tumors of the fundus uteri, an element of uncertainty creeps in, which with

our present knowledge can scarcely be eliminated. This is due to the fact that the tendency of many of the growths which primarily arise in the parenchyma of the organ is to extend towards the cavity of the uterus into and through its mucosa, rendering a true conception of their point of origin very difficult. A close study of some of the reported cases of sarcomata originating in the uterine mucosa rather inclines one to the belief that they may have primarily involved the tissues of the walls and reached the mucosa by extension.

Of the 118 collected by the writer, thirty-three were reported as affecting the mucosa of the fundus uteri. These growths may be diffuse or circumscribed, the former being by far the more common. They are found in irregular masses spread out over the uterine mucosa and composed of round and spindle cells with very little intercellular substance. They may involve all or only a portion of the membrane, and may or may not extend from it into the uterine wall. As in Case LXX, they may by extension into the tissues perforate the wall of the uterus and set up a fatal peritonitis.

The case just referred to was one which was reported as a sarcoma of the parenchyma, but its course and history seem to point to its having originated in the mucosa. Circumscribed sarcomata of the uterine mucosa are very rare, no well-authenticated case having been found among those collected by me. They are polypoid in appearance and have often been mistaken for a simple polypus. Sarcoma of the parenchyma of the uterus may also be diffuse or circumscribed; but the former variety is very rare and but few cases have been reported. This variety of tumor was found in forty-six of the 118 cases above mentioned, a larger percentage of occurrence primarily in the parenchyma than was found by Williams in his 144 cases where sarcomata primarily affecting the mucosa were noted to be in the majority. Senn<sup>3</sup> also states that "diffuse sarcoma of the submucous connective tissue is much more frequent than sarcoma of the muscular wall of the uterus."

The difficulty mentioned above in satisfactorily classifying these two forms may be responsible for this discrepancy in

figures as to their prevalence, added to the fact that, as the microscope is being more generally used to confirm clinical diagnosis, some tumors which might formerly have been classified as myomata have been found to be sarcomata.

Circumscribed sarcoma of the muscular wall of the uterus microscopically closely resembles a fibromyoma, but it is rarely encapsulated. Cystic degeneration of this variety is sometimes noticed. In the forty-six cases included in this report, it is mentioned as having occurred twice.

As has been before stated, sarcoma of the parenchyma of the uterus frequently extends into the cavity of that organ and may perforate into it, hanging down into the cavity like a polypus, for which it has been mistaken.

Some of the cases formerly reported of fibromyomata which have recurred after removal were undoubtedly cases of circumscribed sarcoma of the muscular wall of the uterus. An instance of this kind may be noted by referring to Case IX, in which hysterectomy for a supposed fibroma was followed by rapid recurrence of a sarcomatous growth.

While I have been able to find in the recent literature no well-authenticated case of diffuse sarcoma of the uterine wall, I desire to report one which I consider to represent this variety.

Mrs. S., aged forty-three years; four children, the youngest being eleven years old. No miscarriages. Menstruation has always been regular until July, 1899. At that time she had at her menstrual period very severe "flooding," which persisted at intervals for several days in spite of intelligent treatment by her physician, Dr. Jenkins, of Washington, Iowa. Upon examination, the doctor found a large tumor in the pelvis, which he took to be a large fibromyoma of the uterus.

He advised its immediate removal by hysterectomy, which was emphatically declined by the patient. The hæmorrhages continued at more or less irregular intervals throughout the year. I saw the patient March, 1900. She stated the facts as given above, and said that at no time had she suffered any serious pain. She had lost no flesh, and was very well nourished and of good color. No signs of cachexia other than she said she seemed to be growing weaker.

She was troubled with constipation and frequent urination. Bimanual examination revealed a large tumor of the uterus which filled the pelvis and rose within the abdomen to the level of the umbilicus. It was firm and non-fluctuating and of irregular outline, extending laterally from flank to flank. The history, together with the examination, seemed to point to the presence of a large uterine fibromyoma, and that was my diagnosis. As the hæmorrhages were still frequent, the tumor was increasing in size, and the pressure symptoms becoming more pronounced, immediate hysterectomy was advised, to which the patient consented.

After the usual preparation, I operated, March 5, 1900, at Samaritan Hospital. As soon as the abdomen was opened, the large, irregular, liver-colored tumor was seen filling the lower abdomen and pelvis and crowding the intestines upward out of the operative field. The incision was extended from the pubis to two inches above the umbilicus, and the large tumor mass delivered through it without difficulty, there being no adhesions above the cervix of the uterus.

The uterus was seen to be uniformly enlarged to about the size of a foetal head, and projecting off from either side into the broad ligament were two large growths of almost equal size attached to the uterus by a broad, short pedicle.

These masses were considerably darker in color than the uterine tumor, semifluctuating, and presented a perfectly smooth surface. From the lower anterior surface of the uterus and upper anterior portion of the cervix was a mass which resembled nothing so much as a bunch of huge grapes.

This mass consisted of several distinct spheroidal growths, and was intimately adherent anteriorly to the peritoneal investment of the bladder and posteriorly to the broad ligament. It was shelled out without especial difficulty and with no hæmorrhage, and the entire tumor or tumors removed *en masse* with the uterus, ovaries, and tubes.

There was no hæmorrhage at any stage, and the intestines were walled off with large gauze pads. The patient took the anæsthetic badly from the start, and, though the operation was a comparatively short one, shock was pronounced. She rallied, however, and made a good recovery, and is now attending to

her household duties. It is, of course, too soon to consider the case cured, and a recurrence is greatly to be feared.

Inspection of the specimen shows a symmetrically enlarged uterus about the size of a foetal head, attached to either side of which is a large semisolid growth slightly larger than the uterus and much darker in color. These masses were exceedingly vascular, and upon being incised oozed a large quantity of blood. Their surfaces were perfectly smooth. The ovaries and tubes were not involved and presented a normal appearance. The grape-like mass above mentioned was seen to spring from the anterior uterine wall at its lowest portion just above the level of the internal os.

This mass consisted of eleven distinct globular tumors which were semisolid and of a dark red color, and ranged in size from that of a walnut to that of an orange. They seemed to originate from a common pedicle which was short and broad. They very much resembled in appearance the grape-like or botryoidal sarcomata of the cervix, to be described later. The entire specimen weighed ten and three-fourths pounds.

The microscopical examination was made by Dr. Hal L. Hewetson, Professor of Pathology in the Sioux City College of Medicine. He reported the uterine growth to be a spindle-cell sarcoma which had spread to the broad ligament on either side along the blood-vessels, and that the large masses found were also spindle-cell sarcomata. Examination of the smaller growths forming the grape-like excrescence from the lower portion of the uterus demonstrated that they were also of the spindle-cell variety.

I report this case somewhat at length as, so far as I have been able to ascertain, it is unique in its pathology, combining, as it does, the features of a diffuse sarcoma of the muscular wall of the uterus with those of sarcoma of the cervix, although the bunch of small growths which closely resemble the grape-like cervical sarcomata were more solid than the latter, and did not contain the sticky gelatinous fluid common to them, making the resemblance one of conformation and appearance only.

We have yet to consider the third variety of uterine sarcomata, namely, those which appear primarily in the cervix.

Sarcoma of the cervix also appears in two forms, one of which has characteristics peculiarly its own, and is commonly known as the grape-like or botryoidal cervical sarcoma. Sarcoma of the cervix was noted in twenty-nine of the 118 cases reported, and the same difficulty was found in these cases as is mentioned by Williams in his analysis of the records, namely, that in many of the reports the nature of the growth was not clearly enough described to enable one to say how many of them belonged to the grape-like variety or to some other form of the disease.

Grape-like sarcoma of the cervix uteri was first described by Spiegelberg in 1879, when he reported a case occurring in a girl of seventeen. The cervix was covered with a peculiar yellowish racemose growth consisting of small oval masses from one-half inch to an inch in diameter. These were readily broken, and contained a sticky gelatinous fluid.

Excision of the growth was followed by a rapid recurrence. Munde<sup>4</sup> and Kelly<sup>5</sup> in this country have reported similar cases. The growth may be practically confined to the cervix or may hang down into and fill the vagina.

These tumors usually arise from the mucous membrane of the cervical canal. Spindle-cell sarcomata of the cervix have been described, as have also sarcomata which involve both the cervix and the corpus uteri. These latter forms present no unusual characteristics. One well-marked variety of sarcoma of the uterus remains to be described, namely, sarcoma deciduo-cellulare. In 1888, Sanger<sup>6</sup> described a case of uterine sarcoma "Occurring in a healthy woman aged twenty-three, who had an incomplete abortion in the eighth week. She bled for four weeks, and when Sanger saw her she presented the symptoms of resorptive fever. He curetted the uterus, and the hæmorrhage ceased, but she continued in poor health. The uterus gradually increased in size and a tumor appeared in the right iliac fossa. She developed cough, shortness of breath, became greatly emaciated, and died seven months after the abortion. At the autopsy the uterus was as large as if four months pregnant, and its walls were occupied by tumor masses

of dark red color, the largest being about two inches in diameter. There were metastases of the same character in the lungs, diaphragm, iliac fossa, and the tenth rib of the right side."

This variety is the most malignant of the uterine sarcomata, and is almost invariably complicated by pulmonary metastasis of the disease. It only develops after labor or full term, an abortion or molar pregnancy, and takes its origin from the chorionic villi.

Ten cases of sarcoma deciduo-cellulare were described in the 118 cases of uterine sarcomata here reported. The occurrence of adenosarcoma, carcinosarcoma, melanosarcoma, osteosarcoma, or chondrosarcoma in the uterus has not been indisputably proven, and is, to say the least, very rare. The age of the patient was not stated in all of the reports to which I had access, but taking those in which it was as a criterion, the average age of the women affected with sarcoma of the uterus was thirty-seven years. The ages given ranged all the way from seven months to sixty-seven years.

Seats of predilection. Sarcoma of the parenchyma of the uterus was present in forty-six of the 118 cases, of the mucosa in thirty-three, and of the cervix in twenty-nine. Sarcoma deciduo-cellulare affecting the chorionic villi occurred ten times. It is seen that the muscular wall of the organ was the favorite location of the disease.

In many cases the growth was reported as arising from a fibromyoma, and that fibromyomata of the uterus are frequently transformed into sarcomata seems conclusively proven, which fact must be considered in any case of uterine fibroid which takes on a sudden growth.

As sarcoma of the mucosa occurred thirty-three times, and as this form of sarcoma may closely resemble a simple polypus, the importance of a microscopical diagnosis of all polypoid masses removed from the uterus cannot be too thoroughly emphasized.

As the cervix uteri was involved in twenty-nine cases, the possibility of sarcoma of that portion of the organ should



be in mind when considering any case of uterine disease in which the cervix presents unusual characteristics.

Sarcoma deciduo-cellulare, or sarcomata originating in the chorionic villi, appeared ten times. As this variety is the most fatal of all, its early diagnosis is especially important; and in any case where following labor, abortion, or a molar pregnancy the uterus continues to bleed, and after curettement, if no special reason for such hæmorrhage is discovered, the hæmorrhage continues and the organ is gradually enlarging, the existence of this form of sarcoma must be excluded or established at once.

Here again the early employment of the microscope is of vast importance.

The most common symptoms of all uterine sarcomata are pain and hæmorrhage, though in different cases these are found to exist in widely varying degrees. Upon examination, the uterus will be found enlarged. Cachexia may or may not be marked, depending upon the stage of the disease.

A serous, bloody, or watery discharge is frequently mentioned as one of the symptoms. Of course the pressure symptoms will depend upon the size and the location of the tumor. Among the complications which may be expected in these cases, the most to be feared are the pulmonary metastases which almost invariably accompany the sarcoma deciduo-cellulare, but have also been noticed with the other varieties of uterine sarcomata.

In the nine fatal cases of sarcoma deciduo-cellulare occurring in the present series, pulmonary metastasis was only mentioned as taking place four times; but as some of the cases were very briefly described and not accompanied by any autopsy record, these figures are misleading, and do not correctly indicate the frequency of pulmonary metastasis in this variety of sarcoma.

Pulmonary metastases are also mentioned as having occurred in five of the thirty-three cases of sarcoma of the mucosa of the fundus, and in one of the twenty-nine cases of cervical sarcoma.

Cerebral metastasis was mentioned but once. In Case LXXVIII, which was reported as a melanosarcoma of both the fundus and the cervix, the autopsy showed metastases of the disease in the lungs and upon one semilunar valve.

In Case CXVI, one of the large round cell sarcomata of the mucosa metastases to the lungs and skin of breast is mentioned. In one case of sarcoma of the uterine mucosa one ovary and much of the omentum were involved.

Perforation of the muscular wall of the uterus occurred in two cases of sarcoma originating in the mucosa of the fundus, in one case setting up a fatal peritonitis, and in the other forming a large localized abscess, which discharged through the abdominal wall.

Extension of the disease to the vagina was noted in one case of sarcoma of the mucosa and in one of the cervical variety.

The bladder and rectum were involved in two of the cases of sarcoma of the cervix.

The prognosis is not so favorable in sarcoma as it is in carcinoma of the uterus. In twenty of the 118 cases the result was not stated. Of the remaining ninety-eight, in twelve no radical operation was performed, leaving eighty-six cases in which hysterectomy for the relief of this condition was performed. Of this number thirty-one are stated to have recovered; but as in many cases the subsequent condition of the patient was not closely followed for a sufficiently long time, the real mortality would be larger than these figures indicate.

Of the fifty-five cases in which death occurred, in twenty-two it was mentioned as due to recurrence of the disease, which took place at intervals ranging from five weeks to two years after the operation.

The only treatment which promises anything for the relief of uterine sarcoma is the early and complete removal of the uterus and its appendages.

## REFERENCES.

<sup>1</sup> Contribution to the Histology and Histogenesis of Sarcoma of the Uterus. *American Journal of Obstetrics*, 1894, xxix, 721.

<sup>2</sup> Sarcoma of the Uterus. *British Gynæcological Journal*, 1897-1898, xiii, 91, 110.

<sup>3</sup> Senn on Tumors, page 610.

<sup>4</sup> *American Journal of Obstetrics*, 1894, 545.

<sup>5</sup> Kelly's *Operative Gynæcology*, page 333.

<sup>6</sup> Quoted by Williams, *American Journal of Obstetrics*, 1894, xxix, 721.

# CONTRIBUTION TO THE SURGERY OF MULTI- LOCULAR RENAL CYST.

By CARL BECK, M.D.,

OF NEW YORK,

VISITING SURGEON TO ST. MARK'S HOSPITAL AND TO THE GERMAN POLIKLINIK.

TRUE cystic degeneration of the kidneys in adults is a rare disease. It occurs mostly between the ages of thirty and sixty, and predominates in the male.

Whether it is of congenital origin or not is still open to discussion. While Koenig, Fuerbringer, Rosenstein, Birch-Hirschfeld, and Marchand are in favor of the congenital theory, Ebstein and Virchow doubt it; the latter only admitting that a partial foetal degeneration may last for many years. Leichtenstern, Arnold, and Landau speak of pyelopapillitis or nephropapillitis as a cause, while Lejars assumes a peculiar proliferation of the epithelium of the uriniferous tubules followed by colloid metamorphosis.

In cystic degeneration the kidney becomes considerably enlarged, the greater portion of its substance being converted in a system of cystic cavities, the size of which varies from that of a microscopical speck to that of a large walnut. In nearly all cases both kidneys are more or less affected.

The disease may last for decades without causing any symptoms at all. One of its most deplorable characteristics is that the clinical symptoms generally do not manifest themselves unless the degenerated organ has become greatly enlarged. It is only then that traces of albumen are temporarily found in the urine, so that the suspicion of a renal lesion is raised.

In differentiating, it must be considered that a malignant

tumor would not exist for so long a period without causing marked symptoms, among which cachexia would be most prominent. In pyonephrosis, cystitic or pyelitic symptoms, or tuberculosis, etc., would be found. But hydronephrosis, echinococcus, and cystoma could easily be mistaken for cystic degeneration. It is true that in the latter fluctuation may be detected, while in the others a more solid and nodular tumor may be palpated, but in most instances such differentiation will be unreliable.

Microscopical examination is likelier to clear the diagnosis. In the puncture-fluid from cysts containing dark brown fluid, Hoehne found a number of brown, round bodies, varying from the size of a lentil to that of a five-cent piece. The centre was structureless. They also presented one to five concentric rings, and had a radiating striation from the centre to the periphery. According to Hoehne, these peculiar rosette-like bodies, if found in the puncture-fluid from a supposed renal growth, strongly suggest the enlargement being due to cystic degeneration of the kidney.

Cystic kidney may well be suspected in the case of presence of a renal tumor, when sudden uræmia or anuria occurs in an individual who heretofore had not shown any signs of renal disturbance. The suspicion becomes a certainty if a renal tumor is found on both sides.

The great difficulty in suggesting proper therapeutic means hinges on the question to what extent the other kidney may be diseased. If found normal, extirpation of the renal tumor would be the simplest therapy. To ascertain the state of the other kidney, an incision should be made to permit of inspection as well as of palpation. But how treacherous even then our assumptions may be will be evident from the following history:

Miss S., fifty-five years of age, was admitted to St. Mark's Hospital October 27, 1899. Her family history revealed that two sisters had succumbed to cystic degeneration of both kidneys. The older sister (single) died when fifty-four years of age, from uræmia, no operation having been performed; the autopsy show-

ing the presence of two enormous cystic kidneys. In the other sister, who was married and had two children, a renal tumor was detected when she reached the age of forty. She died ten days after a large cystic kidney was removed. The husband reported to me that on the autopsy degeneration of the other kidney was also found.

Miss S. had always been in excellent health until one year ago, when she began to suffer from slight digestive disturbances. Six months ago, Dr. Alexander Koch, of Brooklyn, detected a hard movable tumor of the size of a man's fist in the left hypochondrium. The specific gravity of the urine, in which traces of albumen were found once in a while, was very low. There was also slight hypertrophy of the left ventricle.

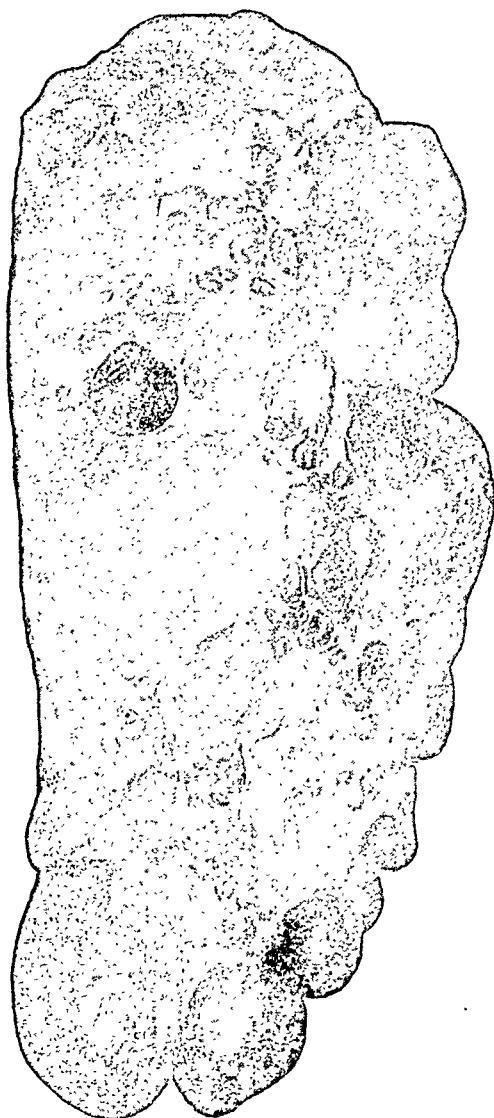
During the last two months the digestive disturbances became aggravated. At the same time the growth increased its size and caused pain, the patient beginning to emaciate at the same time. Examination, October 27, showed the left abdominal side occupied by a solid nodular and movable mass, which reached from the spina posterior superior of the os ilii to the costal arch. It was hard in its centre and gave the impression of fluctuation at its periphery. Examination of the acid and pale urine showed the presence of a moderate amount of albumen and of granulated cylinders. The specific gravity was 1009.

In view of the family history, the diagnosis of multilocular renal cyst was obvious; otherwise the possibility of hydronephrosis would probably have been considered.

Tuffier quotes fourteen cases in which renal cyst was mistaken for ovarian tumor; but in this instance the seat of the growth, especially its attachment to the lumbar region, would have excluded the probability of the ovarian origin of the tumor.

Clinical experience showing that in cystic degeneration both kidneys are nearly always simultaneously involved, I selected the transperitoneal route for operation, opening the abdomen by a vertical incision alongside the outer margin of the rectus muscle. After having ascertained that the tumor was really of a renal character, I examined the right kidney, which appeared but slightly enlarged and gave evidence of the presence of cysts at its lower pole only. So I removed the degenerated organ, which had pushed the diaphragm up as far as to the lower border of the fourth rib, in its entirety. It represented a conglomerate-

tion of cysts, measured twenty-eight centimetres in length, and weighed nearly three pounds. (See illustration.) On the outer surface I could count more than a hundred cysts which varied in size from a small speck to three inches in diameter. They



Multilocular renal cyst.

had penetrated cortex as well as medulla, and were filled with a thin, white-yellowish fluid, which contained uric and hippuric acid and oxalate of lime and cystin. The wound was closed, excepting a small space left for an iodoform wick.

The immediate reaction after the operation was insignificant. The amount of urine passed during the following twenty-four hours was seventeen ounces. There were traces of albumen.

Eight days after nephrectomy the urine became scant, and the albumen as well as the renal cells increased. Uræmia set in, to which the patient succumbed eleven days after the operation. The autopsy revealed that the right kidney had increased its size considerably since the time of operation. The lower pole was also penetrated by cysts of various sizes in the same manner as the extirpated one; so I can only assume that, on account of the additional load of elimination, fatal interstitial nephritis set in.

It is generally accepted that in cystic degeneration nephrectomy is indicated, provided that the other kidney is but little affected. But this experience shows that even a fairly normal condition of the other kidney does by no means warrant a favorable course.

I had intended to expose the right kidney by a lumbar incision as soon as the abdominal wound was healed, and by puncturing the cysts at the surface I had hoped for their permanent destruction. It has become very doubtful to me whether it will ever be justifiable to remove a cystic kidney even when the other appears to be normal. The case described suggested very strongly to me that in cases of cystic degeneration, puncture, followed by the injection of a drop of a saturated solution of iodoform in ether, should be tried in small cysts, while in large ones their peripheral walls should be excised. Very large cysts may even be totally exsected, the wound of the renal parenchyma then being united by sutures of formalin catgut. This can be done by the lumbar route, while the transperitoneal may be resorted to only in obscure cases or when the tumor is of large size.



# CICATRICAL STRICTURE OF PHARYNX CURED BY PLASTIC OPERATION.<sup>1</sup>

By B. FARQUHAR CURTIS, M.D.,  
OF NEW YORK,

PROFESSOR OF THE PRINCIPLES OF SURGERY, UNIVERSITY AND BELLEVUE HOSPITAL MEDICAL COLLEGE.

It is well known how difficult of treatment and how liable to recurrence are the well-marked cases of cicatricial contraction of the pharynx, especially those which are the result of syphilitic ulceration. The authorities state that strictures in the lower division of the pharynx are less obstinate than those between the nose and mouth, but in the case reported below the tendency to recurrence under the most careful handling was striking, and the patient undoubtedly owes her life to the success of the plastic operation.

Grace McT., single, twenty years of age, had had ulceration of the pharynx, due to inherited syphilis, from childhood. In 1895 she was regularly treated by Dr. L. A. Coffin with iodide of potash, and in January, 1898, the ulceration having healed with great cicatricial contraction, he made a series of energetic and patient attempts to divide the cicatricial bands and carry out the usual treatment by dilatation. For eighteen months these efforts were persevered in without success. Several times setons were passed through the bands, and were allowed to heal in so that the openings made were covered with epithelium on their edges, and then the tissue intervening between these openings and the pharynx were cut through. But even then, in spite of careful dilatation, recontraction occurred. Finally, she was referred to me and admitted to the General Memorial Hospital.

<sup>1</sup> Read before the New York Surgical Society, October 24, 1900.

On admission, the patient, a slightly built, pale, somewhat emaciated girl, presented no other lesion than the cicatricial closure of the nasopharynx and the oropharynx. The opening upward from the mouth to the nose was less than one-eighth of an inch in diameter. The opening downward, through which she was compelled to swallow all her nourishment as well as to breathe, was only one-quarter of an inch in diameter. Her breathing was so stridulous as to be heard across a large room when she was at rest, and dyspnœa came on when she walked vigorously. Her diet was restricted to fluids and semisolids. In spite of this serious interference with such vital necessities, she appeared to be in fairly good condition, owing to her naturally strong constitution and to her having been brought up in a healthy country. The lungs were sound, although the current of air was admitted so slowly that it was difficult to hear the respiratory murmur. Heart and kidneys also proved to be healthy.

May 13, 1899, under chloroform anæsthesia, tracheotomy was performed, and the anæsthesia continued through the tube. The head was then drawn over the end of the table and allowed to hang down backward ("Rose's position"). A transverse incision was made above the hyoid bone, extending rather more to the left than to the right, and gradually deepened until the pharynx was opened on the left side between the epiglottis and the tongue. A careful examination showed that the lower pharynx was shut off from the upper by a membranous septum extending from the posterior pillar of the fauces and left side of the pharynx across to the base of the tongue. The right side was almost free from cicatricial tissue, and the septum was very thin at the margin of the opening (which lay to the right), but was very thick nearer its attachment to the left side of the pharynx. The mouth was kept open by a gag and the tongue drawn forward by a thread which had been previously passed through its tip. With the finger in the wound below the septum, the edge of the membrane was divided from above through the mouth, a knife being used until the finger could be forced through, and the opening then forcibly stretched with the fingers until three of them could be passed freely up into the mouth. Only moderate hæmorrhage followed.

The wound thus made upon the left side of the pharynx ex-

tended from below upward from the glosso-epiglottic fold of mucous membrane to the level of the hard palate, and from before backward from the tonsil to the posterior wall of the pharynx. The parts on the right side readily stretched out nearly to normal size, and the tongue regained its natural position. The epiglottis and larynx, and the neighboring pharyngeal mucous membrane, were healthy.

A flap was then cut from the skin of the left side of the neck, its base at the angle of the jaw, its apex directed downward and forward, its anterior (superior) margin corresponding with the incision made in opening the pharynx, and the posterior (inferior) margin parallel with the latter. This flap included the skin and subcutaneous tissue, and was about five inches long and two inches broad. When it had been dissected up, three silk sutures were passed through its distal margin, being left untied and their ends passed into the pharynx, drawing after them the flap. The flap was reflected upward so that its raw surface lay in contact with the wound on the left of the pharynx, and its epithelial surface was turned to the cavity of the pharynx. By means of a curved needle the three sutures already mentioned were in turn passed through the edge of the mucous membrane at the upper end of the raw surface on the left side of the pharynx. The introduction and tying of these sutures was the most difficult part of the entire operation. The flap having been fastened thus, it was further secured by sutures of very fine silk passed at intervals along its margins. The upper pharynx was then packed with gauze so as to still further press the flap into place, and a sterile dressing applied to the neck. The operation was rather long, two hours in all, but the patient bore it well and soon reacted from the shock.

Rectal feeding was at once instituted, and was continued for seven days. No infection occurred; the flap healed well in place, and the patient's highest temperature was 101° F. on the second day after the operation. After the first week she was fed by introducing a stomach-tube cautiously through the mouth. On the tenth day, under local anæsthesia, the flap was divided transversely, where it adjoined the mucous membrane of the pharynx. On the fourteenth day the patient was allowed out of bed.

June 6, twenty-four days after the first operation, again in chloroform anæsthesia, the opening in the pharynx was closed

by suture. The opening barely admitted two fingers at that time, and the cut edge of the transplanted skin had retracted well up into the pharynx. The remaining portion of the flap (towards its base) was dissected back from the edge of the opening, the numerous folds in it being straightened out, and it was turned down over the raw surface on the side of the neck, covering about one-half of it. The edges of the mucous membrane of the pharynx on the inner side of the opening into that cavity were dissected free and united with sutures of fine silk. The retraction of the transplanted skin had drawn it up above this opening. The skin on the external margin of the opening was dissected up and its edges also united with silk sutures. The remainder of the raw surface on the side of the neck was covered with Thiersch grafts taken from the thigh. Rectal feeding was maintained for four days, the stomach-tube was used for one day, and then the patient was allowed to swallow some fluid by mouth. This was quite difficult at first, but the function was soon restored. I should have preferred using the stomach-tube for feeding a few days longer, but was forced to give it up because the patient objected so strenuously, and was so nauseated by the tube, perhaps because of the sutures having altered the position of the epiglottis, for she had been fed in this manner without bad results ever since the first operation, and had formerly appeared thoroughly accustomed to the tube. The wound healed rapidly and almost completely by primary union. The tracheotomy-tube was removed a few days after the last operation.

She was discharged from the hospital with all wounds healed June 24, and given a No. 4 soft rubber Wales rectal bougie, about three-quarters of an inch in diameter, with instructions to pass it at regular intervals, and at least once a week for some months. She had regained some flesh and color in spite of her prolonged rectal feeding, and was able to swallow and breathe with perfect freedom. She made little use of the bougie, but, in spite of that fact, there has been very little recontraction. At present the bougie passes, although with some difficulty. The transplanted skin in the pharynx has assumed the appearance of mucous membrane, as is usual with skin transplanted into the mouth. The external scars are sound and not greatly disfiguring, as the widest parts are beneath the collar. There are no fistulæ or sinuses. She swallows well, and the respiration is only noisy on exertion,

as it must still be carried on through the mouth. Her general health has improved.

A hasty search through the literature reveals no similar operation, although I can hardly doubt that some one has employed this method. Mesny reports thirty-four cases of cicatricial stricture at this level, and states that there is little tendency to recontraction (Thèse de Bordeaux, 1893, quoted in Heymann's "Handbuch der Laryngologie und Rhinologie," Wien, 1899, 11, p. 446). But there are several of these cases on record in which dilatation with small incisions failed to cure or caused serious accidents, such as hæmorrhage so severe as to require ligation of the carotid to control it. Park has reported (*International Medical Magazine*, July, 1893, p. 550) a case similar to mine in which tracheotomy and gastrostomy were done as life-saving operations because of a low pharyngeal stricture with a lumen one-quarter of an inch in diameter, the patient being too irresponsible to allow systematic treatment by dilatation. It is for these serious cases that the operation here described is recommended.

# THE IMPROVED TECHNIQUE IN THE OPERATIVE SURGERY OF CARCINOMA OF THE STOMACH.<sup>1</sup>

By WILLIS G. MACDONALD, M.D.,

OF ALBANY.

THE history of abdominal surgery is one of material and continued advancement. Its field of usefulness has presented progressively extending borders until each organ of every system has become amenable to surgical and life-saving intervention. In general, the diagnosis, indications for operation, surgical technique, and post-operative treatment are firmly established; surgical principles confirmed by abundant, painstaking pathologic and clinical observation, collective operative experience, and the results attained in experimental surgery. The final determination of the established surgical methods in the treatment of uterine myoma, biliary calculi, appendicitis, and extra-uterine pregnancy is a triumph of surgery, the life-saving value of which is quite inestimable.

Although so much has been accomplished in the last three decades, there yet remain other fields for reinvestigation and the establishment of surgical methods which will more uniformly influence the treatment of the future. Carcinoma of the stomach is one of these fields for reinvestigation, and recently it is receiving its full share of careful consideration. At the last meeting of the American Surgical Association, a number of papers were presented dealing with the various phases of the subject. The results of the general discussion have been most important in showing the necessity and possibility of early diagnosis, the desirability of early exploration in obscure gas-

<sup>1</sup> Read before the Southern Surgical and Gynæcological Association, November 14, 1900.

tric disturbances, and, above all, the advantages of operative intervention uniformly undertaken.

The relative frequency of carcinoma of the stomach has been studied by a number of observers independently. Tan-chow, after an investigation of the cause of death in 382,851 cases, came to the conclusion that six-tenths per cent. were due to carcinoma of the stomach. Virchow, after an extensive investigation of the material available at the pathological institute in Berlin, found that nearly 2 per cent. of deaths arose from this cause. Welch, in investigating the cause of death in 11,175 cases that came to autopsy in the pathological institute at Prague, found that  $3\frac{1}{2}$  per cent. of all the cases died from carcinoma of the stomach. Van Valzah, after a careful investigation of carcinoma of the stomach as an item in general mortality tables, came independently to the conclusion that more than 1 per cent. of all deaths were due to that disease. Considered from another stand-point, Welch found, after a comparative study of 30,000 cases of malignancy, that 21 per cent. of them were carcinoma of the stomach, and Virchow places the proportion still higher, at 35 per cent. No age is exempt from it. At least two cases of congenital carcinoma of the stomach have been reported, but the combined investigations of a very large number of independent observers, including the collective statistics of Gurlt, Lindner, Hammer-schlag, Welch, and Hemmeter, go to show that in the interval between the fortieth and sixtieth years nearly 60 per cent. of the cases of carcinoma occur.

Much attention has been recently attracted to the apparent increase of cancer in general. Statistics in this relation have been arranged by Park in this country, by the health authorities of the United Kingdom of Great Britain and Ireland, and in Switzerland. All of these statistics agree that carcinoma is far more frequent at the present time than it was a few decades ago. Welch, in his study of the location of the growth in 1300 cases of carcinoma of the stomach, came to the conclusion that in more than 60 per cent. of the cases it occupied the pyloric region, in 12 per cent. the lesser curvature, in .8 per

cent. the cardia, and in 20 per cent. other portions of the stomach wall.

One of the most serious complications in carcinoma, in general, is early lymphatic invasion in the neighborhood of the tumor. Careful examination would seem to indicate that this occurs later in the course of carcinoma of the stomach than in carcinoma of the breast, uterus, tongue, and rectum. It is a matter of common observation that patients die from carcinoma with pyloric stenosis before any very extensive lymphatic invasion occurs. I had occasion recently to examine the specimen removed from a patient, at autopsy, who had persistently refused operation. In this case, although the most careful investigation was made, only a single group of lymphatic glands was found involved. Perry, after a study of thirty-eight autopsies in which the cause of death was carcinoma of the stomach, found that in 18 per cent. there were no secondary deposits in other regions. McArdle collected 1342 cases of cancer of the stomach, of which 802 were limited to the pylorus, and out of this number 496 were not associated with important lymphatic involvement. Gussenbauer, as the result of the examination of the autopsy registers in 542 cases of carcinoma of the pylorus, states that in 41 per cent. there was no metastasis of the disease in other organs, and that in 37 per cent. there were no adhesions.

These pathologic conditions, based as they are upon a sufficiently large number of cases to present valued conclusions, seem to indicate beyond question that cancer of the stomach under proper conditions, with sufficiently early diagnosis and correct surgical technique, affords the opportunity for much life saving.

Unfortunately, we find a considerable difference of opinion among surgeons, first of all, with relation to surgical interference in any case. A large number of good surgeons are yet lukewarm in their advocacy of radical operation in carcinoma of the stomach, or are active in the opposition of any surgical intervention. A favorite form of argument against radical surgical intervention lies in the fact that no very considerable



number of cases has remained free from recurrence for any length of time after operation, and that the operation itself is primarily associated with a very high mortality. I have taken occasion recently to make a cursory investigation of literature with relation to this subject, and have been able to find forty-three cases for which pylorectomy was done for carcinoma of the stomach, and that the patients were living without recurrence three years after the operation, and that there were patients in this group who were alive ten years after the primary operation, without symptoms of recurrence. I may also say that this group of forty-three cases is collected from among 527 operations done for the relief of pyloric carcinoma, with an immediate mortality of 31 per cent. In other words, we have from the work already done rather more than 8 per cent. of final recoveries as judged by ordinary standards. This will compare very favorably with the ultimate success which we enjoyed a few years ago in the treatment of cancer of the breast. More recent statistics with relation to this matter, however, have shown wonderful improvement in the direction of final cure due to earlier surgical intervention and wider extirpation of the disease. A number of surgeons are now able to show groups of cases in which more than 50 per cent. of the cases have passed the three-year limit without any indications of recurrence. While carcinoma of the stomach presents, from a diagnostic stand-point, greater difficulties, and technically the operation requires greater skill, yet it is but reasonable to assume that when the treatment of carcinoma of the stomach is placed upon the same basis as that of the more modern treatment of cancer of the breast, equally advantageous results are to be expected. A considerable number of pylorectomies were done, extending over a number of years without any very material improvement in the technique of the operation, and until recently few operations were undertaken until the tumor could be determined by abdominal palpation.

The technique employed by Billroth in his first pylorectomy was the technique of operations employed by most surgeons for a number of years, or, at least, with very slight modi-

fications. This earlier operation presented many technical difficulties in its performance. The matter of the adjustment of the resected stomach and the duodenum at the completion of the operation was frequently defective. The operation of suture where two portions of the intestinal tube of different calibre is required is frequently a matter of considerable difficulty, nor can absolute security be attained. Secondary perforation at the line of suture with subsequent peritonitis has been a frequent cause of death associated with this earlier form of operation. In order to avoid some of these difficulties, Kocher devised the method of closing entirely the resected stomach and reimplanting the duodenum in its posterior wall. This method of operation was a material improvement over the original Billroth method. Still another method, and the one to which I particularly wish to call attention in the present communication, is the method by means of which both the duodenum and stomach are closed by suture, and subsequently a gastro-enterotomy is made by the method of von Hacker or Wölfler.

Before entering into a more accurate description of the preferable forms of surgical intervention in this serious disease, it is profitable to consider somewhat the limitations of early and late exploratory abdominal section in the treatment of this condition. More recently, a number of surgeons have expressed an opinion that the favorable time for operation in carcinoma of the stomach is past when palpation reveals a tumor in the epigastric region. The presence of tumor has until recently been held as a necessary requisite to operative intervention. I believe that careful consideration of the problems involved will demonstrate the extreme desirability of operative interference at an early date; that improved methods of diagnosis, including the physical exploration of the stomach and the chemical and bacteriological examination of its contents, will show in a very considerable number of cases sufficient cause for early exploratory laparotomy. A part, or a combination of symptoms, is a sufficient indication for operation; first, a chronic gastritis which is progressive in character

under proper dietetic, medicinal, and physical treatment; second, a loss of gastric motility; third, progressive diminution of gastric peristalsis; fourth, a diminution of free hydrochloric acid, progressive in character; fifth, emaciation of the patient under forced diet (Gerhardt regards this as a very important symptom, and has frequently observed a loss of one-half a pound or more per day in carcinoma of the stomach. Personally, I have observed a loss of five pounds per week for a number of weeks in succession); sixth, reduction of the hæmoglobin in the blood, progressive to 65 per cent. or under, and a moderate leucocytosis. It will be noted that the presence of hæmoptemesis, lactic acid, the Oppler-Boas bacillus, and the epigastric tumor are omitted from this list of indications for operation. These symptoms, as a rule, appear too late to permit of radical surgical intervention.

In many cases many of these symptoms may be absent, and yet an exploration can be readily justified. If carcinoma is not found, some other condition, such as perigastritis, benign pyloric stenosis, or gastric dilatation, is likely to be quite as much benefited by surgical intervention as the other condition of cancer.

The operation for the radical extirpation of cancer of the stomach will necessarily have its modifications by surrounding anatomic conditions. In carcinoma of the pyloric region, these conditions will always be found most favorable, and the probability of a favorable ultimate prognosis the greatest. The symptoms of carcinoma of the lesser curvature or of the cardia are not so distinctive, nor so likely to attract the attention of the physician or the patient until much greater progress of the disease has occurred. The close proximity of the lesser curvature to the great blood-vessels and lymphatic channels will necessarily lead to wider and more inaccessible lymphatic infiltration than elsewhere. Where the cardia is involved, the lower portion of the œsophagus is much more liable to infiltration, together with the retro-œsophageal glands, than is the duodenum when the pylorus is invaded.

It will be seen after careful consideration that the widest

extirpation is demanded in carcinoma of the stomach. In this connection I desire to call attention to the careful investigations of Cuneo and Most with relation to the distributions of the lymphatics and lymph nodes as associated with carcinoma of the stomach. All surgery for carcinoma of necessity involves the removal, as far as is compatible with adjacent anatomical structures, of lymph nodes. These are very well illustrated in the drawing (Fig. 1) presented by Cuneo showing the group of lymphatic glands; one group lying along the lesser curvature in the gastrohepatic omentum in immediate

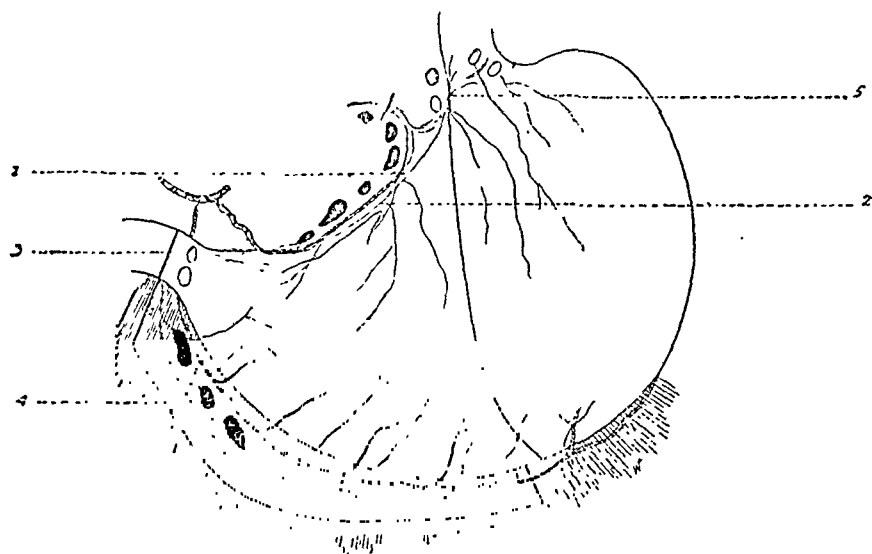


FIG. 1.—Drawing (schematic) showing groups of lymph nodes frequently infiltrated in carcinoma of stomach. B. Cuneo, *Revue de Chirurgie*.  
1. Lesser curvature; 2. Lesser curvature; 3. Retropyloric; 4. Infrapyloric; 5. Retro-oesophageal.

relation to the coeliac axis and the hepatic blood channels. Another group is found along the greater curvature, a third along the outer border of the cardia, while other groups are found respectively in the retropyloric and the retro-oesophageal spaces. In a complete pylorectomy, it is extremely desirable to remove the lymphatics along both curvatures of the stomach as well as those lying behind the pylorus. This should be made a part of the routine of any radical operation. A second drawing (Fig. 2) shows the relative lines of invasion of the

different layers of the stomach wall, besides the limits of infiltration of the surrounding lymphatics. As a rule, the duodenum is not extensively involved in pyloric carcinoma, although a few observers have found infiltration of Brunner's glands in the upper portion of the duodenum.

There is little justification for the total extirpation of the stomach in a majority of cases, and the probability of cure will not be greater than surgical resection. The old rule of cutting one centimetre beyond all evidences of carcinomatous infiltration is not wide enough. Personally, I feel that the line of

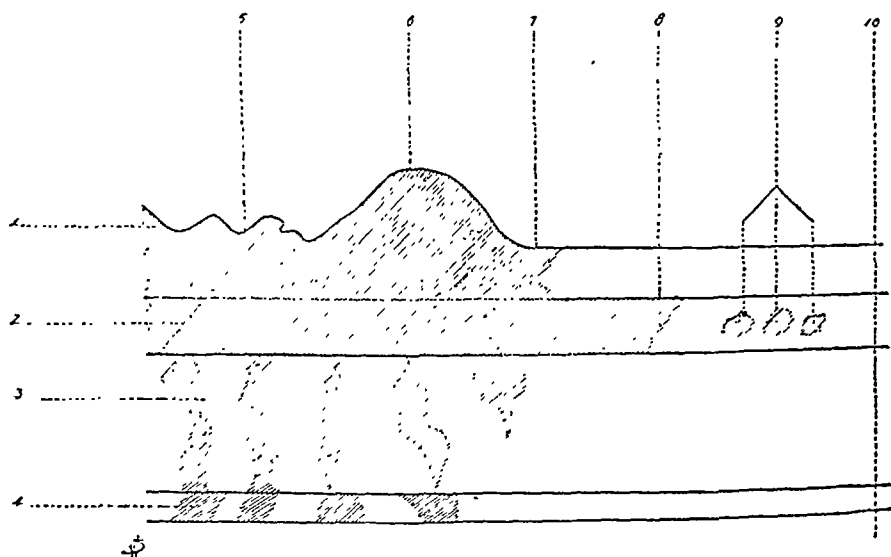


FIG. 2.—Schematic drawing illustrating the carcinomatous invasion of the stomach wall. B. Cuneo, *Revue de Chirurgie*. 1. Mucous; 2. Submucous; 3. Inframuscular; 4. Subperitoneal; 5. Ulceration; 6. Border of ulceration; 7. Limit of mucous ulceration; 8. Limit of submucous ulceration; 9. Aberrant lymphatics; 10. Ideal line of surgical section.

excision in the stomach should be at least three centimetres from the border of the last palpable infiltration, and in the duodenum at least two centimetres from the most dependent portion of the growth.

Reference has already been made to the sources of failure in employing the older technique of Billroth for pylorectomy. The first, and chief, undoubtedly has been due to infection from the stomach contents at the time of operation; the

second, from defects in the method of suture of the resected portions of the stomach and duodenum; and third, from the

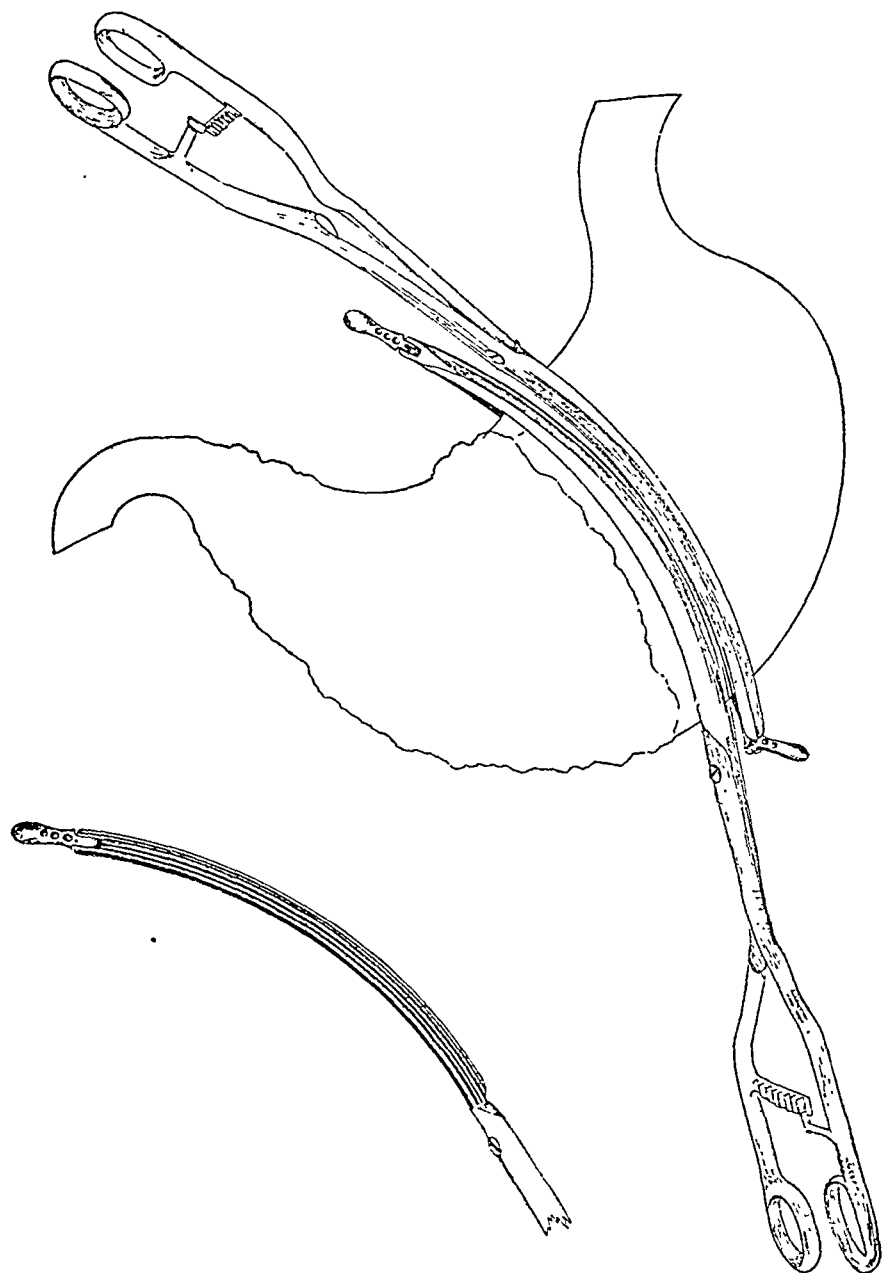


FIG. 3.—Drawing (schematic) illustrating use of Kocher's stomach clamps.

condition of biliary regurgitation into the stomach after operation.

A variety of clamps have been devised to overcome the first difficulty. I am familiar, however, with none so satisfactory as the more recently devised clamps of Kocher. The accompanying drawings show very well their mode of application. (Figs. 3 and 4.) When accurately adjusted, there is very little opportunity for leaking of the stomach contents, and they present material advantages in the control of hæmorrhage from the wall of the stomach. By the application of

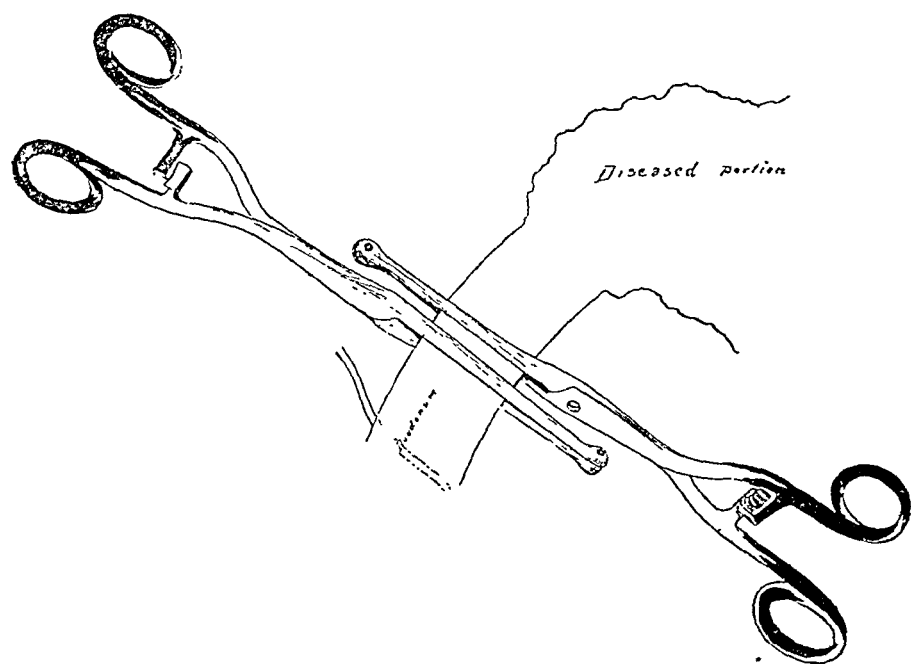


FIG. 4.—Drawing showing adjustment of intestinal clamps.

these clamps to the stomach and duodenum with a little care, all dangers of sepsis from the stomach and duodenum are avoided, and the rapidity with which a pylorus may be resected is greatly increased. Very little time is required to close the ends of the stomach and duodenum with a running catgut suture involving all the coats. (Fig. 5.) This, again, is invaginated within the stomach and the calibre of the duodenum, and the stump buried by rows of Lembert sutures. (Fig. 6.) The manner of performing the subsequent gastro-enterostomy lies largely with the preferences of the surgeon

doing the operation. My earlier gastro-enterotomies were done by the Wölfler method of attaching the jejunum and the anterior wall of the stomach. It appears to me that the

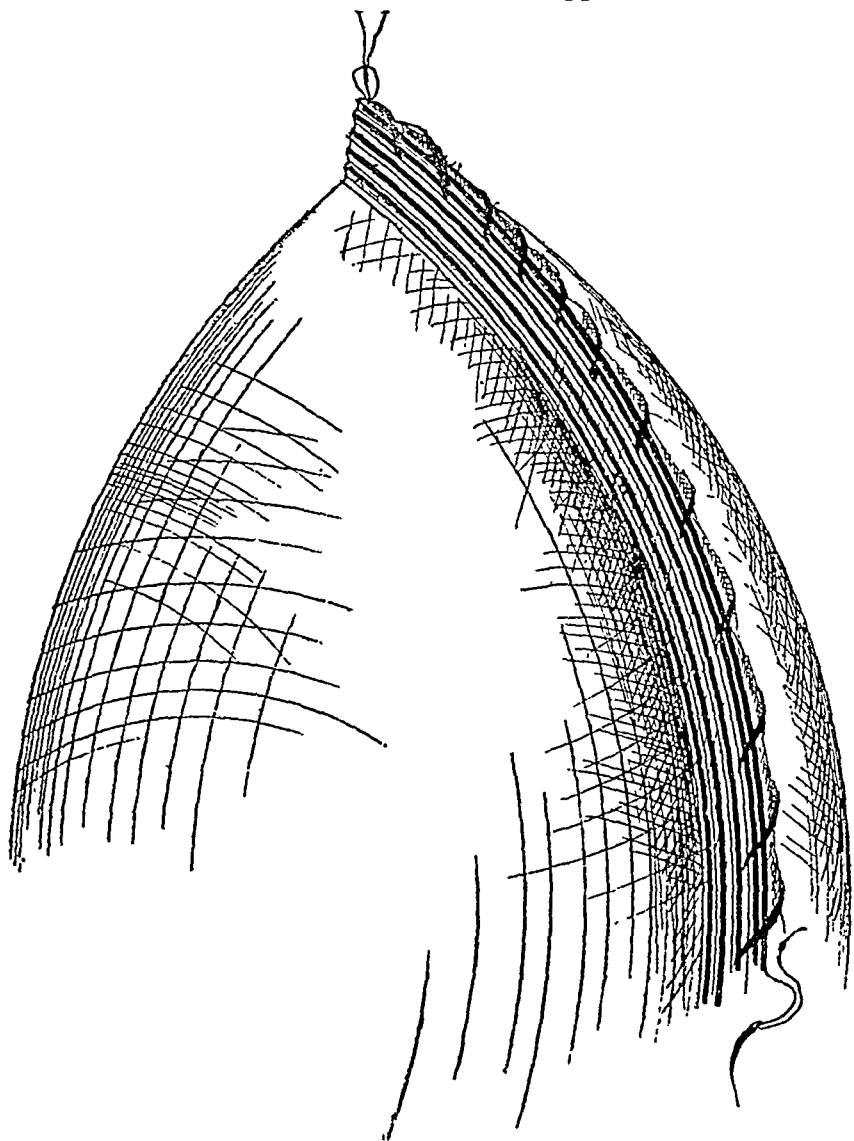


FIG. 5.—Drawing illustrating method of closing stomach and duodenum.  
First suture through all coats of medium catgut.

two fatal cases in which I applied that method were due to regurgitation of bile into the stomach and persistent vomiting following operation. Some two years ago I commenced employing von Hacker's method of attaching the jejunum



to the posterior gastric wall with a re-anastomosis between the duodenum and the jejunum. The results of this method of operation have been most satisfactory. During the past year I have employed it eight times, with seven recoveries. For the most part the anastomosis between the jejunum and stomach has been made by the suture method, although a number of surgeons have been quite as successful in the employ-

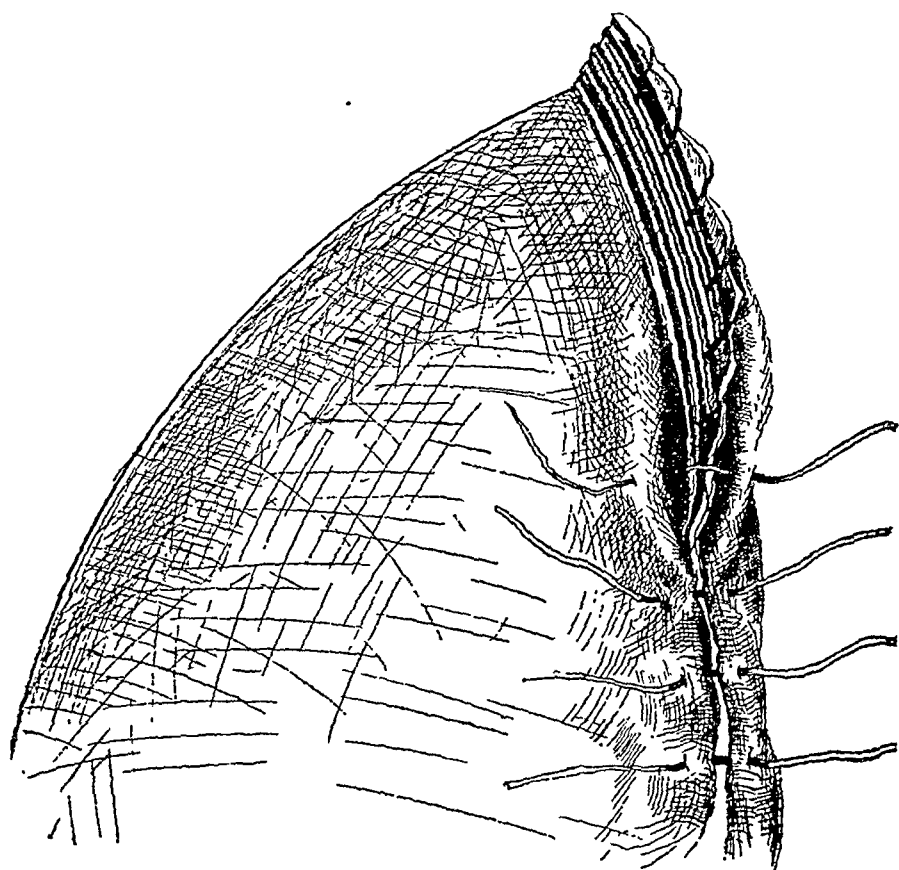


FIG. 6.—Drawing illustrating method of closing stomach and duodenum.

ment of the Murphy button. For the secondary anastomosis, I have uniformly used the Murphy button of moderate size. The anastomosis by this method requires very little time for its performance and can be readily completed in five minutes. While the entire technique of this operative procedure appears quite complicated, yet under favorable circumstances I am

sure the entire operation can be done within forty minutes, including the closure of the abdomen.

When an operation has been carried out by this method to its completion, the following advantages may be claimed: first, freedom from contamination of the wound by stomach contents; second, accessibility of the neighboring lymphatic nodes for extirpation; third, no subsequent danger from suture perforation; fourth, freedom from loss of blood; and, fifth, the great saving of time required for the operation. The surgeon is not embarrassed in the least by the amount of tissue which he removes, as no effort is made to bring the duodenum and the remainder of the stomach in apposition.

Lateral anastomosis can be readily accomplished by a variety of methods, including the button. Practical experience has shown through the more recent statistics of Mikulicz, Maydl, Kocher, and others, that an operation of this form presents far less immediate dangers to the patient than does the older method of Billroth.

But not all cases can be regarded as suitable ones for radical operation. Are we then to close our exploratory incision when we find extensive lymphatic invasion, infiltrated adhesions to the surrounding organs and to the parietal peritoneum? Experience has shown, again, that even in these cases life may be prolonged, the disagreeable symptoms associated with the disease distinctly ameliorated, by the operation of gastro-enterostomy. I have performed this operation already a number of times and afforded patients agreeable relief. In some of the advanced cases I have not hesitated to employ the Murphy button for the purposes of the operation, and under such circumstances it can be readily completed within a half-hour.

The immediate mortality for the operation of pylorectomy is an interesting study. Ewald condemned the operation because of its great mortality, 73 per cent.; and until 1888 the mortality was somewhere in the neighborhood of 60 per cent. Billroth's mortality was 45 per cent., Mikulicz 30 per cent., Kronlein 25 per cent., Maydl 16 per cent., Kocher 8.7 per cent. Mayo Robson, in a study of 572 cases collected from various

sources, finds an average mortality of 30.4 per cent. Guinard found that in 148 cases of pylorotomy with end-to-end anastomosis, deaths were fifty-six, or 37.8 per cent., and in sixty-four cases of pylorotomy with subsequent lateral anastomosis

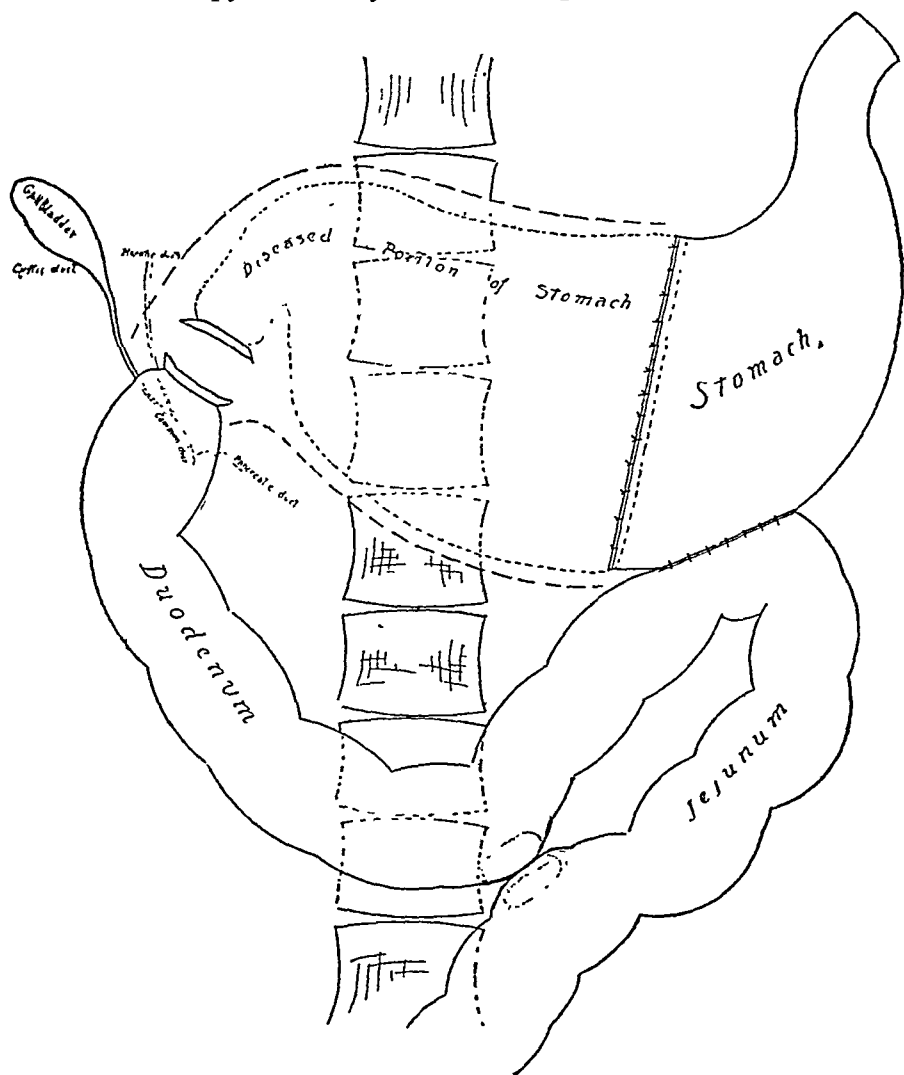


FIG. 7.—Drawing (schematic) illustrating operation of resection of stomach.

there were ten deaths, or 15.6 per cent. This showing has been equally favorable in the experience of others.

The last illustration (Fig. 7) shows graphically the extent of tissue which may be removed and the sites of invagination and anastomosis.

# CASES OF COMPOUND OR COMPLICATED FRACTURE ILLUSTRATING THE VALUE OF OPERATIVE INTERFERENCE IN THE TREATMENT OF THESE INJURIES.<sup>1</sup>

By HENRY R. WHARTON, M.D.,

OF PHILADELPHIA,

SURGEON TO THE PRESBYTERIAN AND CHILDREN'S HOSPITALS; CLINICAL PROFESSOR OF SURGERY IN THE WOMAN'S MEDICAL COLLEGE.

*Compound Dislocation and Fracture of the Lower End of the Tibia, with Fracture of the Fibula.*—M. L., aged forty-five years, while standing upon the step of a shifting engine, was thrown off and struck the track violently, his weight coming upon the right foot, producing a fracture of the internal malleolus, with a compound inward dislocation of the tibia at the ankle, and a fracture of the fibula about two inches above its lower extremity.

He was brought to the Presbyterian Hospital, and I examined him soon after his admission, when I found the lower end of the tibia protruding from a ragged wound in the skin at the inner side of the ankle; the internal malleolus was separated and broken into several fragments, and was still attached to the internal lateral ligament. The astragalus was not fractured. The posterior tibial artery and vein were not injured. The wound was slightly enlarged to obtain a clear view of the parts. In view of the good circulation in the foot, I decided to resect the lower end of the tibia and a portion of the astragalus. About an inch and a half of the tibia and a portion of the astragalus were removed. The fibula was not resected, as it was found possible to bring the foot into its normal position in regard to the leg, the oblique fragments of the fibula slipping by each other, thus producing a compensating shortening. All loose fragments of bone

<sup>1</sup> Read before the Philadelphia Academy of Surgery, May 7, 1900.

were removed, the wound was irrigated with bichloride solution, a large drainage tube was introduced, the wound was partially closed by sutures, and a copious gauze dressing was applied. The limb was next placed in a posterior binder's-board gutter splint, which was secured by a bandage, and for additional security was placed in a fracture-box. The wound was dressed on the fourth day and was found to be in good condition, and a plaster-of-Paris bandage was applied and trapped over the region of the wound. The patient did well after the operation, but healing was somewhat slow, as the wound was primarily infected and did not run an aseptic course. At the end of six weeks the patient was able to go about on crutches, and in a few months was able to walk upon the limb with comfort. The patient now has resumed his work as a switchman, and walks without a limp, and has good motion in the injured ankle.

This case represents a class of cases which many of us can remember as most unfortunate ones, before the modern methods of wound treatment had been adopted. It was formerly the rule in these cases to subject such cases to immediate amputation, for experience had proved that a more conservative method of treatment was usually followed by diffused abscess, septicæmia, spreading gangrene, pyæmia, and death; and only in exceptional cases was secondary amputation of the limb at a higher point able to save the life of the patient.

*Compound Comminuted Fracture of the Tibia and Fibula.*—X., aged fifty years, was admitted to the Presbyterian Hospital suffering from a compound fracture of the tibia and fibula caused by the kick of a horse. I saw this patient shortly after his admission, and upon examination of the injured limb was struck by the great amount of shortening and the great increase in the circumference of the limb in the region of the injury. There was a ragged wound over the front of the leg about midway between the knee and ankle.

The patient was etherized, and after the leg had been shaved and sterilized as far as possible, the wound was enlarged upward and downward in the line of the tibia, and it was then found that a fragment of the tibia, about three inches in length, occupied a transverse position between the ends of the fractured

bone, its only attachment to the living tissues being by muscular fibres of the flexor longus digitorum and the interosseous membrane. There were also present in the wound a number of good-sized separated fragments of bone. The fibula was also fractured near the seat of the tibial fracture. The anterior and posterior tibial arteries were found on examination to pulsate freely at the ankle. The vascular supply of the limb below being unimpaired, I decided to fix the upper and lower fragments to the large bone fragment of the tibia, and thus diminish the extensive shortening which would follow its removal, and make an attempt to save the limb. By making extension and by manipulation at the same time, I was able to fit the separated fragment between the separated ends of the tibia. I next removed a number of completely detached fragments. The large fragment was next fixed in position by a strip of perforated silver plate, secured by silver screws to the upper, lower, and intermediate fragments. When fixation was secured in this manner, it was found that the fragments of the fibula were in good position, so that no attempt was made to fix them. Several drainage tubes were introduced, and the wound was partially closed by sutures. A copious sterilized gauze dressing was applied and the limb was put up in binder's-board splints and placed in a fracture-box. The latter splints were changed in a few days, and a fenestrated plaster-of-Paris splint was applied. The patient did well, although there was some suppuration in the wound, and finally recovered with a useful limb, with a very moderate amount of shortening.

The result in this case was satisfactory to me, as in my experience it was the largest semidetached fragment which I have ever seen fixed to surrounding fragments and retain its vitality. Examination of this patient some months after he had left the hospital showed that union was only moderately firm between the upper end of the tibia and the detached fragment, and the patient was still using crutches. The application of a brace will permit the patient to use the limb, and will at the same time probably strengthen the union at this point.

*Fracture of the Fibula with Marked Displacement of the Lower Fragment.*—R., aged twenty-three years, while riding a bicycle, was struck by the fender of a trolley-car and sustained

a fracture of the left fibula, about two and a half inches above its lower extremity, and a fracture of the internal malleolus of the tibia, with great contusion of the soft parts. I saw the patient, with Dr. Hermann Allyn, on the day after the injury, and found the above-described injuries. The limb had been placed in a fracture-box, and the fragments seemed to be in good position.

Ten days after the injury, when the swelling had somewhat subsided, Dr. Allyn notified me that there was a marked deformity in the region of the fibular fracture, and I again saw the case with him. On examination, I found that the upper end of the lower fragment of the fibula projected upward, well above the lower end of the upper fragment; and although it was possible to partially reduce the deformity by manipulation, as soon as the reducing force was removed the deformity recurred. Finding it impossible to permanently correct the deformity, I advised that the fracture be exposed, and that the fragments be fixed in their proper position by a silver-wire suture or silver plate.

The patient was etherized, and an incision was made over the seat of the fracture. Upon exposing it, a strip of muscular tissue, probably from the peroneus tertius, was found between the ends of the fragments; this was displaced, and the ends of the upper and lower fragments were drilled, and a heavy silver-wire suture was introduced and secured, holding the fragments in good position. The wound was closed without drainage and a gauze dressing was applied, and the limb was put up in moulded binder's-board splints; these were taken off in ten days, and the superficial sutures were removed, as the wound was healed. A plaster-of-Paris bandage, including the foot and leg, was then applied, and this was removed at the end of six weeks, as firm union was present at the seat of fracture.

In a large number of fractures of the fibula which have come under my observation, I have never before seen a similar deformity, and from the conditions found to exist at the seat of fracture it is not possible that the deformity could have been remedied or satisfactory union could have occurred other than by operative interference.

*Fracture of the Lower End of the Fibula with Fracture of the Internal Malleolus of the Tibia, with Marked and Persistent*

*Deformity.*—J. G., aged fifty years, received a fall in stepping from the pavement to the street and sustained a fracture of the right fibula about two and a half inches above its lower extremity, and at the same time a fracture of the internal malleolus of the tibia. He was seen a short time after the accident by Dr. William E. Hughes, who asked me to see the case with him. Upon examination, we found the fractures above described, and at the same time there was such marked eversion of the foot that the edge of the tibia seemed about to protrude through the skin. The foot was also very much flexed by the action of the muscles inserted into the os calcis through the tendo-Achillis. All attempts to reduce the deformity were unavailing, so that an anæsthetic was employed; the reduction was then accomplished, and the limb was put up in binder's-board splints. At the next dressing of the case it was found that as soon as the splints were removed the deformity immediately recurred in as marked a degree as before, and could not be reduced until an anæsthetic was given. The greater the force employed to correct the deformity the greater was the muscular resistance offered.

As the deformity seemed to be largely maintained by the muscular force exercised through the muscles inserted into the os calcis through the tendo-Achillis, I decided to do a tenotomy of the tendo-Achillis, and then, having corrected the deformity, apply a plaster-of-Paris bandage. The patient was etherized, the tendo-Achillis was divided subcutaneously, and the deformity was then reduced without difficulty. The malleolus was well padded with cotton, and the foot was held in a position of over-correction while a plaster-of-Paris bandage was applied. This bandage was retained for four weeks and was then removed, and the fragments were found to be united in good position; a light plaster bandage was then applied and worn for a few weeks longer, and when this was removed the patient was allowed to use the limb in walking, and the result was entirely satisfactory.

I have resorted to tenotomy of the tendo-Achillis in several cases of fracture of the tibia and fibula occurring in the lower parts of the leg, where it was found impossible to correct an anterior displacement of the upper end of the lower fragment of the tibia by other means; but this is the first case of Pott's fracture in which I have found it necessary to resort to



this procedure to obtain a satisfactory correction of the deformity.

*Comminuted Fracture of the Upper Extremity of the Humerus; Excision of the Shoulder-Joint with a Useful Arm.*—J. B., aged fifty-five years, was admitted to the Presbyterian Hospital, having received a fall from a cherry-tree, striking the ground with his right shoulder. Upon examination of the right shoulder shortly after his admission to the hospital, I found great swelling of the soft parts in the region of the right shoulder, and a comminuted fracture involving the humerus in the region of the shoulder-joint; the shaft of the humerus was drawn upward, and apparently was completely separated from the head of the bone, and one sharp edge of the humerus had perforated the deltoid muscle and could be felt projecting almost through the skin. It was found impossible to reduce this deformity without the aid of an anæsthetic; this was given, and the deformity was reduced, and the arm was put up in a Ferguson dressing. The next day, upon removing the dressing, it was found that the deformity had recurred, and that the skin was in great danger of perforation by the sharp end of the lower fragment of the humerus.

Dr. Willard saw the patient with me, and we decided that it would be wise to cut down upon the fracture and fix the fragments by sutures if possible, to prevent a recurrence of the deformity. I explained to the patient that, if it was found impossible to fix the fragments by sutures, his best chance of a useful arm would follow an excision of the head of the bone, and obtained his consent to do what we considered best at the time.

The patient was etherized, and the seat of the fracture was exposed by an incision; it was found that there was marked comminution of the upper extremity of the humerus, which also extended to the head of the bone, so that it was impossible to fix the shaft of the humerus to the head of the bone by sutures. This condition existing, I proceeded to excise the head of the bone, and also resected a portion of the end of the shaft of the humerus, so as to furnish a smooth surface to articulate with the glenoid cavity. The wound was drained and closed by sutures, and a copious gauze dressing was applied; a wedge-shaped pad of sterilized cotton was placed between the arm and body, with

the base of the wedge at the elbow, so as to bring the end of the humerus as nearly as possible in relation with the glenoid cavity. The arm was then fastened to the side of the body by the turns of a bandage.

The wound ran a perfectly aseptic course and was firmly healed in a few weeks; the patient did well except for an attack of pneumonia, which prevented his leaving his bed for some weeks. When he recovered from this attack, he was allowed to go about with his arm in a sling, and was encouraged to use it as much as possible. When last seen, some months after the accident, he had good use of the arm.

In comminuted fracture involving the neck and shaft of the humerus, and in fractures of the neck of the humerus with displacement of the head of the bone, where it is often difficult or impossible to replace the dislocated head of the bone, I believe that much better functional results would be obtained if excision of the joint was more generally resorted to.

*Extensive Gunshot Wound of the Shoulder-Joint; Excision of the Joint, with Recovery with a Useful Arm.*—C. E., aged sixteen years, was admitted to the Bryn Mawr Hospital in December, 1899, having received an extensive gunshot injury of the left shoulder. In climbing a fence with a gun in his hand the weapon was discharged, and the charge of No. 7 shot entered the tissues just above the anterior fold of the axilla, passed backward and upward, and emerged just above the spine of the scapula. Upon examination of the patient I found an oval lacerated wound just above the anterior edge of the axilla, and upon passing my finger into the wound I discovered that the upper part of the shaft and head of the humerus were extensively comminuted, and also that the acromion process was separated from the scapula; the deltoid muscle was extensively lacerated, the axillary vessels were uninjured, and the circulation in the arm and forearm was unimpaired. In view of the non-involvement of the blood-vessels in the injury, I decided to remove the comminuted fragments of bone, resect the end of the shaft of the humerus, and excise the head of the humerus.

The patient was etherized, and the anterior and posterior wounds were enlarged by incision, and a number of loose frag-

ments of bone were removed; a portion of the head of the humerus which still remained in the glenoid cavity was also removed. The upper end of the shaft of the humerus was turned out of the wound and sawn off, so as to give a smooth surface for articulation with the glenoid cavity. The separated acromion process was fastened to the scapula by a heavy wire suture. A large drainage tube was passed through the anterior wound and brought out of the posterior one, and some sterilized gauze packing was also introduced to control the venous hæmorrhage, which was quite free. The anterior wound was next partially closed by sutures and a copious gauze dressing was applied; a wedge-shaped pad of sterilized cotton was placed between the arm and the body, with the base of the wedge at the elbow, and the arm was then securely fastened to the side.

The subsequent history of the case was uneventful, and the patient was discharged from the hospital with fair motion of the arm at the shoulder.

Dr. Branson, who had charge of the patient after the operation, states that he has seen him recently, and that the result is an excellent one.

Examination of the injured arm five months after the injury shows that the wounds are healed, and that the patient has free motion at the shoulder-joint; the most marked disability being shown in lifting the arm, which is accounted for by the great wasting of the deltoid muscle; this condition is probably largely due to destruction of the muscle itself as well as to the injury of the circumflex artery and nerve at the time of the accident.



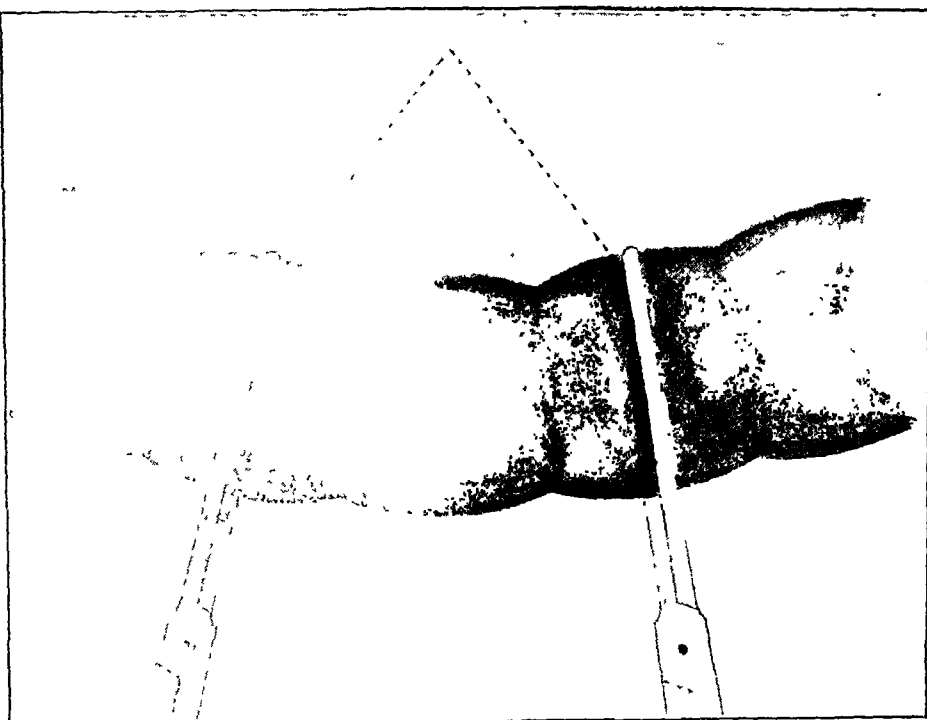


FIG. 1.—Showing the manner of placing forceps in resection of bowel; dotted lines show the incision to be made.

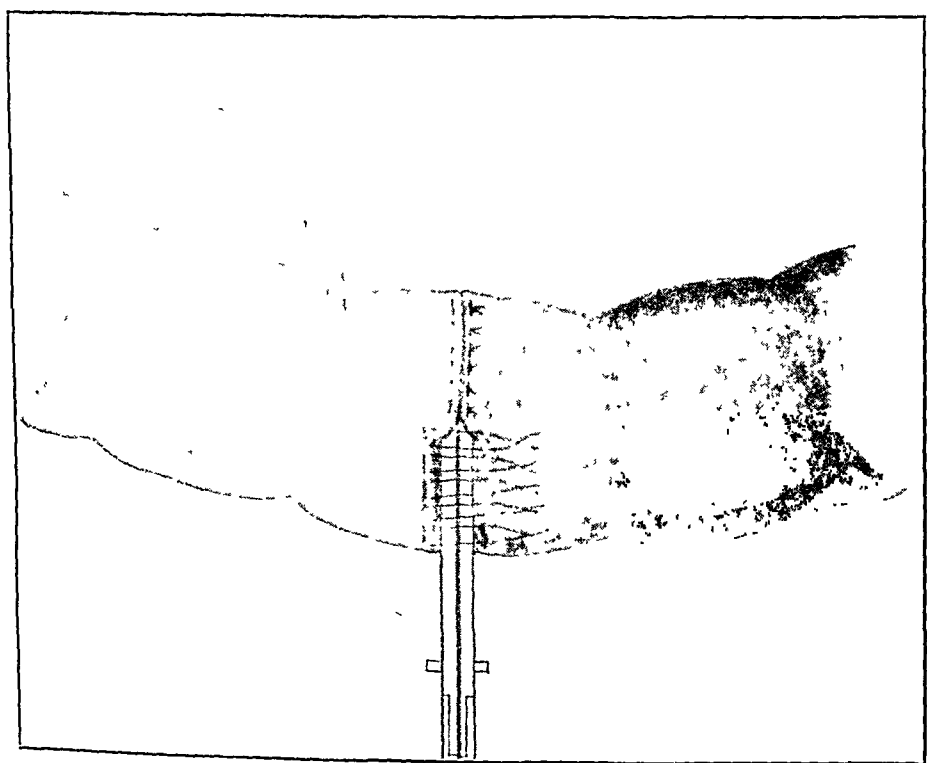


FIG. 2.—End-to-end anastomosis. Forceps brought together and held by serre-fine (not shown); sutures introduced, some of which are tied.

# A METHOD OF PERFORMING ANASTOMOSIS OF HOLLOW VISCERA BY A NEW INSTRUMENT.<sup>1</sup>

By M. O'HARA, JR., M.D.,

OF PHILADELPHIA,

GYNÆCOLOGIST TO ST. AGNES HOSPITAL; ASSISTANT SURGEON TO GYNECEAN  
HOSPITAL, AND CHIEF OF SURGICAL CLINIC AT THE MEDICO-  
CHIRURGICAL HOSPITAL.

A THOROUGH appreciation of the responsibility one takes upon himself when he offers something that differs from the procedures that are in vogue, has prompted me to use every endeavor to find wherein this instrument which I present was weak. I am pleased to state to you, however, that if an error exists in its application I have been unable to find it. I have met with results of the most satisfying character in all of my experimental work on the lower animals. Basing my assumption upon the knowledge thus obtained, I unhesitatingly offer these forceps to the profession, confidently feeling that, if the forceps are used as they should be, they will win the same confidence in the hands of others that they have in mine.

My experimental work has gone on for the past nine months, and I can state that I have found the forceps in their application to possess advantages not to be found in any of the methods now in use. To briefly mention some of these advantages: First of all is the wide application of a single instrument: with the same instrument one may do a resection of the pylorus, of the cæcum, and of the small or large intestines. Anastomosis can also be performed on any of the hollow viscera, including the large and small intestines, stomach, and even intestines of unequal calibre; the various gall-bladder

<sup>1</sup> Read before the Philadelphia Academy of Surgery, May 7, 1900.

operations can also be performed. In fact, I cannot conceive any of the gastro-intestinal operations that cannot be performed by the use of this instrument.

An exceedingly strong factor in favor of the forceps and method is the manner of closing off the bowel cavity at once; this is the first step in all operations where the forceps are employed, the bowel remaining closed until the very last moment; when the forceps are removed it is through a very small opening, an opening so small that it is under the thorough control of the operator; thus the dangers of fecal matter escaping into the peritoneal cavity are prevented.

Rapidity is an essential factor, where such rapidity does not sacrifice careful and accurate work. A method the speed of which is not at the expense of accuracy, is the only method one can consistently use in gastro-intestinal surgery, and it pleases me to say to you that the speed of my method has not been at the expense of accurate work.

In comparing this method with the Murphy button operation, it may take a moment or so longer; but I think the extra time spent in forceps approximation of the bowel is well spent when one considers the very decided advantages gained. It is certainly more surgically complete than leaving a foreign body in the intestinal canal, which causes no little anxiety until the patient has voided it.

Secondary stricture of the bowel is another important matter for consideration in this class of work. The dangers of this complication are reduced to the minimum in the method under discussion.

The calibre of the bowel is not impaired in the least degree, as the bowel is spread out to its fullest extent, without stretching, by the forceps before sutures are introduced. As to the amount of gut inverted, this, I think, causes no difficulty if it be within reasonable bounds, as in a very short time it undergoes an atrophy; in fact, in my dog work, I was surprised to find that this atrophy occurred in several cases to such an extent that in a week's time one could hardly find any trace of the gut that was inverted. In these cases I turned in

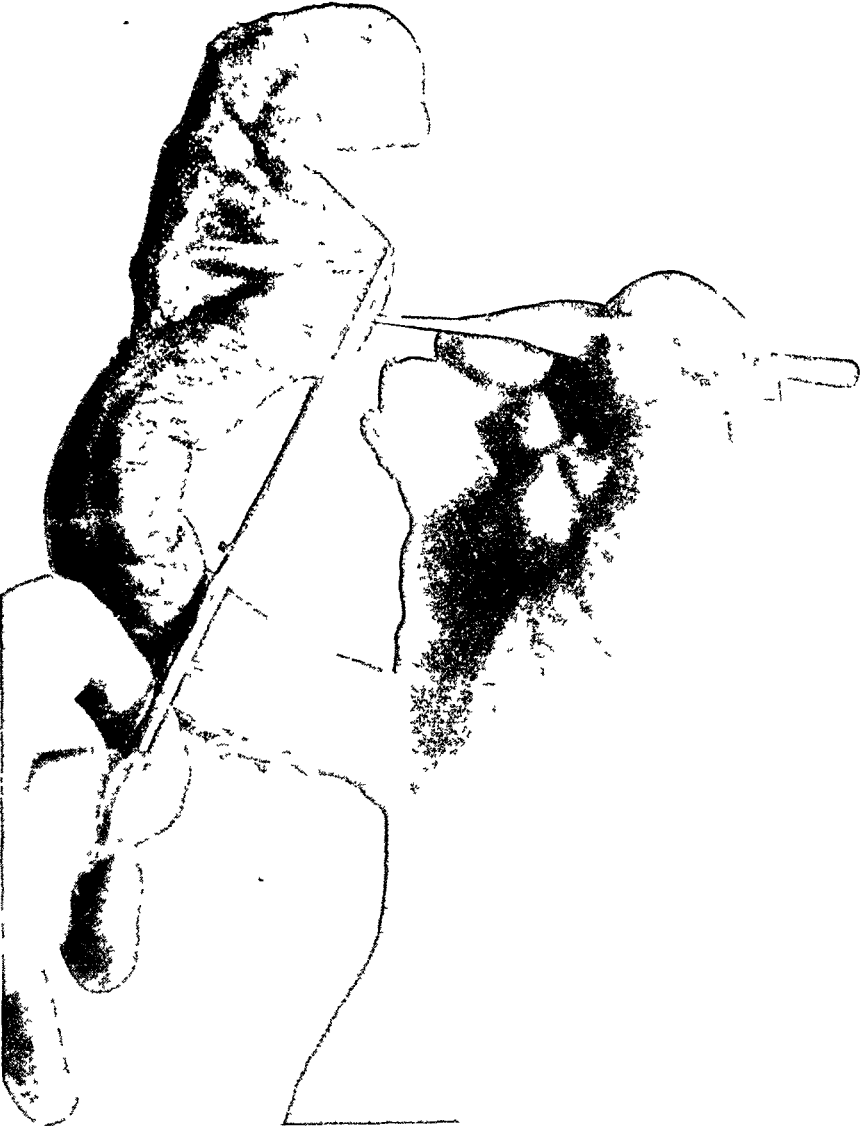


Fig. 3—Lateral anastomosis      Forceps applied in a line with the long axis of the gut.





about a half an inch, which was more than was required, and on examination a week later I could only find about a sixteenth of an inch projecting into the lumen of the gut.

I need not dwell upon the necessity for accurate suturing to obtain successful results in all bowel work. In comparing this method with some of the other artificial means to assist in suturing accurately, such as the inflatable rubber bags, all that is needed is for one to see the forceps used to be convinced of their superiority. A test that I have employed to satisfy myself of the accuracy of my suturing has been to tie one end of the sutured gut, place the other end on a faucet and turn the water on; if I had used ordinary care, no leakage would occur at the line of suturing, the stitches tearing out before any leakage would occur. This procedure is about as severe a test as one could employ, certainly in the human subject the strain is never so great as this.

To summarize the points of advantage claimed for this method:

- (1) Reduction of the dangers of sepsis.
- (2) Rapidity.
- (3) Accuracy.
- (4) Wide range of application.
- (5) Simplicity.

These I would term the cardinal points to success in gastro-intestinal surgery as well as in gall-bladder surgery.

The instrument consists of two pairs of straight forceps, the jaws of which are very slender and two and a half inches long, for ordinary work; for special work they can be made longer. Instead of being roughened as in the ordinary hæmostatic forceps, they are grooved down the centre of one blade; the opposite one has a ridge, similar to a pile clamp; both forceps are held together by means of an adaptation of the serre-fine.

*Method of doing a Resection, followed by an End-to-end Anastomosis.*—The serre-fine clamp is removed, and one forceps is placed transversely across the bowel at the point selected to mark the upper border of the resection, and locked; the

other forceps is placed in the same manner at the lower margin of the resection. The tips of each forceps should be on an exact line with the mesenteric attachment. Forceps are placed upon the ends of the intervening portion of the intestines, to prevent any leakage from this source. Then with a pair of curved scissors or a scalpel cut the bowel rather close to the forceps, the incision being carried into the mesentery so as to remove a wedge-shaped piece, avoiding the wounding of any important vessels; if bleeding occur from any of the smaller vessels, a clamp can be placed on it temporarily.

The two forceps are then brought and held together by means of the serre-fine clamp, the sutures are then introduced, starting at the point nearest the lock of the forceps and carrying them down to the tips, where a little care should be exercised to get accurate apposition of the gut at its mesenteric attachment. I have found it necessary at times, where the mesentery was quite dense and broadly attached, to nick it with a pair of scissors and push it back to allow the bowel to turn in properly. If an interrupted suture has been employed, it is now necessary to tie before proceeding to the other side. The forceps are now turned over and the sutures are placed in the same manner, only they are started from the tips of the forceps, and are carried up until the level of the first suture has been reached. The forceps are now unclamped; one pair removed by unlocking and drawing out in a straight line; the other is unlocked and passed above and below the line of suturing within the canal of the gut to insure that both walls of the gut have not been included in any of the sutures. They are then withdrawn and the remaining opening closed by one stitch. If the operator desires it, he can now run a row of sutures to reinforce the first. The incision remaining in the mesentery is closed in the usual manner.

*Method of doing Lateral Anastomosis.*—The gut is picked up by means of a rat-toothed forceps, and one pair of forceps is applied in a line with the long axis of the gut. The tip must be on an exact line with the edge of the gut; the forceps includes just so much of the gut as the size of the mouth one

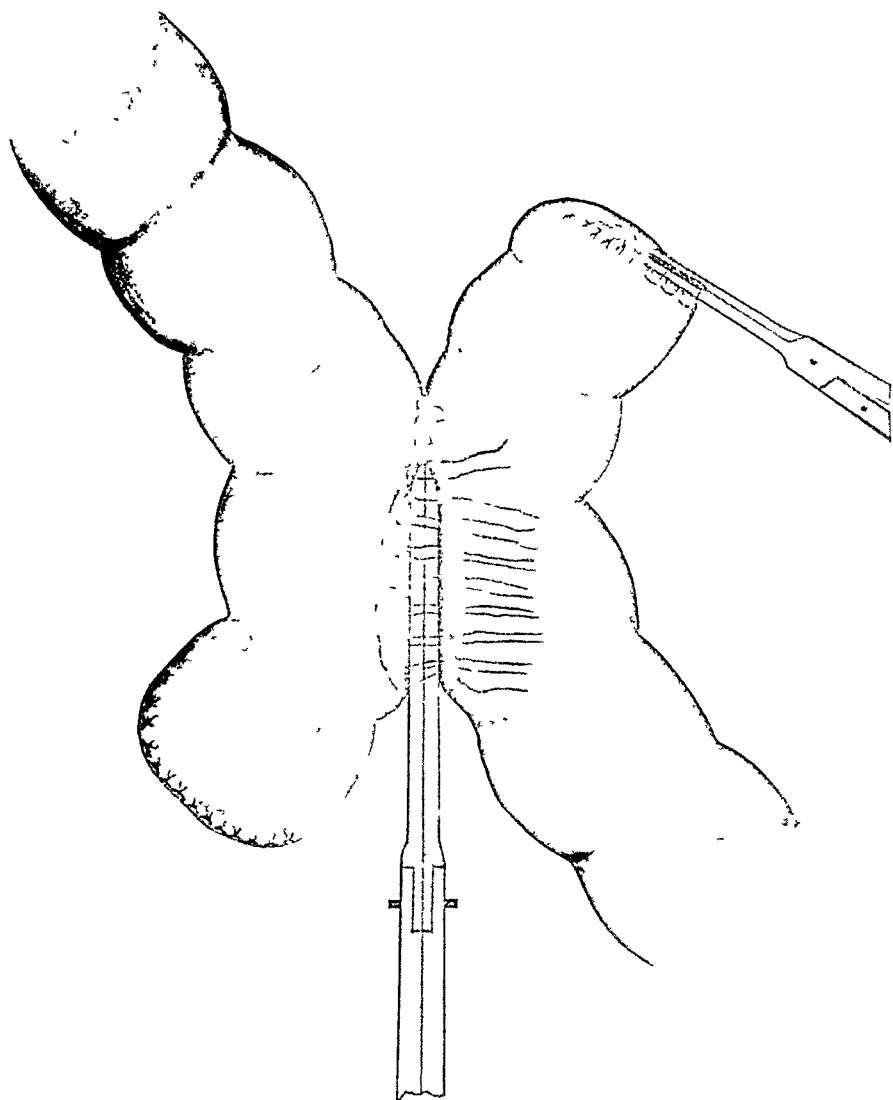


FIG. 4.—Lateral anastomosis Shows forceps brought together and held by serre-fine (not shown) ; sutures introduced, some of which are tied. Also shows manner of placing forceps in invagination with sutures applied, some of which are tied.



intends to make; the other forceps is placed in the same manner, at the point where it is intended to make the other mouth, using care to pick up the same amount as in the first forceps; this can be done by observing the graduated lines that are on the forceps. Then with a pair of curved scissors cut fairly close to the forceps and remove the gut that projects beyond the forceps; the forceps are now brought together and held by the *serre-fine* clamp. The sutures are introduced from the lock to the tips in the usual manner, using a little extra care on reaching the tips. The sutures are now tied and the forceps turned over; sutures are placed on this aspect of the gut from the tips towards the lock to the level of the first suture. The sutures are now tied and the forceps unclamped, one being removed, the other being unlocked and passed to each side of the line of suturing, to make sure that both walls of the gut have not been included in any of the sutures. This forceps is now removed and the small opening closed by one suture, and if it is desired, another row of sutures can now be placed to reinforce the first.

The mouth made after this method is one that is made by the removal of an oval-shaped piece of tissue, thereby lessening the possibility of secondary contraction. As to the size of the mouth, this can be made as large as the fancy of the operator may dictate.

In dealing with the open ends of the bowel, as is the case at times after lateral anastomosis, one pair of forceps is all that is required. It is placed as in the end-to-end operation and the bowel turned in upon itself and serous membrane stitched to serous membrane. This method is almost identical with that followed by Dr. Ernest Laplace, except that I place the tip of the forceps on a level with the mesenteric attachment; by so doing it is only necessary to place one stitch when the forceps is removed.

The forceps can be used to anastomose bowels of unequal calibre, as is the case in resecting the cæcum; by placing the forceps upon the large gut at the point it is desired to resect and on a corresponding point of the small gut, using care to

place the forceps in such a manner that it corresponds to the point of desired entrance into the large gut; the forceps are then clamped together and the sutures passed from the small to the large gut, and so continued until the small and large gut have been sutured on each side, when the forceps holding the smaller gut is removed. A suture is now placed with a little care to close that point where the small joins the large gut. The large gut is now sutured upon itself, as in the method of invagination. When all the sutures are in place and have been tied, the forceps are passed above and below the line of suturing of the small bowel, to be quite sure that the sutures have not included both walls of the gut; the small opening that remains is now closed, and if it is desired another row of sutures can now be placed to reinforce the first. The above method can also be applied to resection of the pylorus with little or no modification.

A practical point to which I might call attention is, that one should bear in mind, in placing the forceps, to place them in such a manner that they can be turned over readily without putting any traction on the gut.

In closing, I wish to thank Dr. H. D. Beyea for his assistance in helping me with illustrating the text. I wish also to acknowledge the debt of gratitude I owe Dr. Alfred Stengel for extending me the use of the Pepper Laboratory, where every facility was given me for carrying on my experimental work.





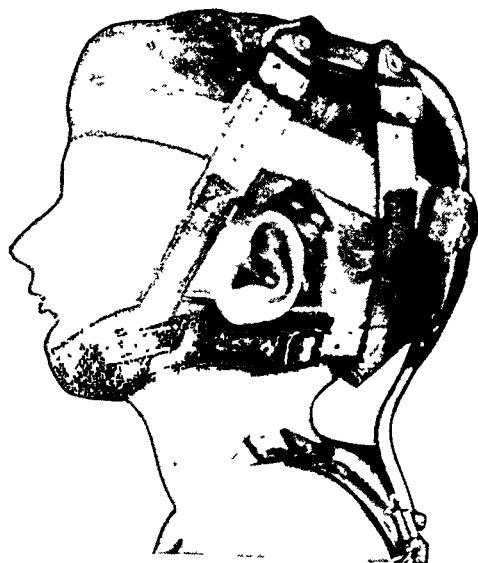


FIG. 1.

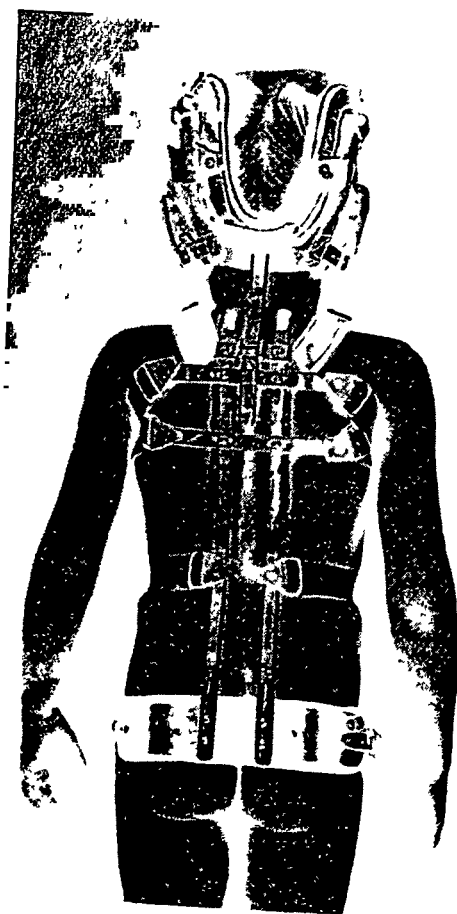


FIG. 2.

I. AN IMPROVED BRACE FOR HEAD EXTENSION.  
II. A HARD RUBBER SPRING BRACE FOR LAT-  
ERAL CURVATURE.<sup>1</sup>

By JOSEPH M. SPELLISSY, M.D.,

OF PHILADELPHIA.

SURGEON TO ST. JOSEPH'S AND THE METHODIST HOSPITALS; ASSISTANT SUR-  
GEON TO THE ORTHOPÆDIC HOSPITAL AND THE ORTHOPÆDIC DEPART-  
MENT OF THE UNIVERSITY HOSPITAL; SURGEON TO THE  
OUT-PATIENT DEPARTMENT OF THE  
PENNSYLVANIA HOSPITAL.

THE pieces of apparatus herewith described were devised during my service with Dr. Willard at the University Hospital. It is through his courtesy that they were made at the University Hospital machine shop.

I. BRACE FOR HEAD EXTENSION.

Theoretically, the ideal splint for a kyphotic tending spine is recumbency; but even cases that have enjoyed it with advantage must, finally, become ambulant with mechanical support, and this in highly located lesions must extend to the head. Next to recumbency, extension by suspension is most effective in combating a kyphotic tendency.

The jury-mast is an efficient exponent of the suspension principle, but patients complain that it is unsightly, and it permits lateral motion, which is sometimes undesirable.

The Taylor head-piece operative through extension by means of a chin-cup is not sufficiently convenient in adjustment to insure modification daily, and the degree of extension obtained is far short of suspension.

The Goldthwaite head-piece does not apply suspension or extension. It is a thorough posterior splint of the head and spine and it prevents lateral motion.

Suspension as complete as that of the jury-mast, but

<sup>1</sup> Presented before the Philadelphia Academy of Surgery, May 7, 1900.

more controllable, convenient, and slightly, and also splinting as rigid as that of the Goldthwaite apparatus, is obtained in the adaptation of jury-mast and Taylor and Goldthwaite head-pieces described and illustrated below. (See Figs. 1 and 2.)

A keeper and a sliding-bar fastened by a set-screw similar to the device for the adjustment of the Taylor chin-cup are fastened at the top of the uprights of a Taylor spine-brace. The sliding-bar, however, instead of supporting a chin-cup, bifurcates at the occiput into two padded uprights, against which the head may be strapped by a webbing band passing round the brow and fastened by a buckle on each upright as in the Goldthwaite head-piece; but the uprights now take on the character of a double jury-mast. They turn at right angles and go horizontally forward, not above the head but loosely round it, on a level with the angle of the parietal bone, and they stop a little in advance of a vertical line through the anterior margin of the ear. These horizontal extensions of the uprights each have two buckles, which receive the webbing straps of an ordinary leather suspension-bridle or head-piece.

The brace is fixed below by the pelvic band, which grips the hips below the anterior superior iliac spines. Therefore, when the webbing straps of the head-piece are tightened, extension is applied to the spine between the pelvis and the chin and occiput. This extension is by suspension, and its degree is necessarily adjusted to the patient's need, at least, each time the brace is applied. Although webbing wears out more rapidly, it is preferable to straps with punched buckle-holes because permitting more perfectly graduated adjustment.

The webbing band round the brow—to limit lateral motion—should be adjusted last, otherwise it would interfere with the adjustment for extension.

This brace head extension was devised by me two years ago, and I have found it satisfactory for cases of cervical and high dorsal Pott's disease.

Dr. G. G. Davis, I have recently discovered, reported some five years ago a somewhat similar device, to which mine may be a duplicate, although independently conceived.

## II. HARD RUBBER SPRING BRACE FOR LATERAL CURVATURE.

Cases of lateral curvature may be roughly divided into those treated by exercises alone and those treated by exercises and a brace. The brace is used in some cases as a reminder for patients who habitually revert to a vicious posture as soon as they escape from supervision, and braces are employed for others because the degree of deformity is gross.

The brace I exhibit is designed for the first class of cases. It was suggested by the spring bow-leg brace. A pad is placed over the deformity and is fastened to two convexly bent springs. When the ends of the springs are brought close to the body, considerable pressure is made on the deformity. A pelvic band and perineal strap hold the spring fast below, the pad is applied to the posterior deformity, and the upper end of the double spring is buckled in place by a strap passing round the opposite shoulder and side of the neck. As is seen (Fig. 2), considerable correction is effected in this way, and an indolent or forgetful patient is kept straighter.

[The brace is made of 18 gauge (about  $\frac{1}{16}$  in.) untempered sheet steel coated with hard rubber. The spring characteristic depends entirely upon the rubber coating. By gently heating over a gas jet, the springs may be bent so as to make them stronger or weaker as occasion requires. The cleanliness, durability, freedom from rust, and the adjustability of the hard rubber truss, suggested the use of the same material for the brace now described.]

# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, November 14, 1900.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

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## CHOLECYSTECTOMY.

DR. HOWARD LILIENTHAL presented a woman, thirty-four years old, who was admitted to Mt. Sinai Hospital on the 8th of May last. She had never had any symptoms pointing to gall-bladder disturbance until two weeks before, when she complained of severe abdominal pain, especially in the right hypochondrium and extending through to the midscapular region. These pains subsided after two or three days, but returned after an interval of two days. During the two weeks previous to her admission to the hospital she had had several similar attacks. She had never been jaundiced; she had no chills, but thought she had been feverish. The bowels were regular; there were no urinary symptoms.

An examination at the time of her admission showed that her general condition was good. There was no icterus. There was marked congestion over both lower lungs. There was a systolic murmur at the apex and the second pulmonic sound was exaggerated. There was dulness in the right flank. The region of the appendix and gall-bladder could be palpated without eliciting much pain. No distinct mass could be felt and no free fluid could be made out by the physical signs. The liver percussed below the free border of the ribs. The temperature was 102° F.; pulse, 140. On the following day the temperature had risen to 103.4°, and slight conjunctival icterus was noted.

May 14, 1900, through a large abdominal incision, the gall-bladder was found pretty well under the liver, so that it could hardly have been palpated in so stout a patient. It was tense and apparently filled with stones. On account of the practical absence of icterus, and because of the apparent absence of stones

in the common duct on palpation, Dr. Lilienthal determined to remove the gall-bladder, which was evidently diseased to such an extent that it could not have been expected to functionate normally again. The excision of the gall-bladder was done by encircling the cystic duct with a stout silk ligature, which was then tied very tightly, and the ends of the ligature were allowed to protrude through the wound. The liver attachment of the gall-bladder was pretty broad, and was secured by two long uterine clamps placed parallel to each other, one on each side of the attachment. The gall-bladder was then excised and the clamps left *in situ*. Most of the wound was closed, with drainage. Seven hundred and sixty-two stones were found in the gall-bladder. These were exhibited by Dr. Lilienthal.

The patient reacted rather poorly from the operation and required active stimulation. Her temperature rose to 104.6°, and signs of pneumonia were detected at the right apex. The congested condition of the lower lungs which had been noticed at the time of her admission had in the mean time disappeared. The clamps were removed two days after the operation, and this gave rise to no hæmorrhage. Her temperature gradually fell with the disappearance of her pulmonary symptoms, but on the fifth day it rose again and remained elevated for a few days; this was probably caused by a stitch suppuration due to a sloughing superficial wound of the abdominal wall which had resulted from the application of an ice-bag previous to her arrival at the hospital.

On May 26 the sutures were removed. There was practically no discharge from the wound. The patient was out of bed on June 7, but she was kept in the hospital until the fifth of the following month before the silk ligature with which the cystic duct had been tied off could be removed. In a similar case since then, Dr. Lilienthal said, he had employed chromicized catgut for this purpose with much more satisfactory results.

#### CHOLECYSTOTOMY AND CHOLEDOCHOTOMY; SECONDARY CHOLECYSTECTOMY AND OPERATION FOR LIVER ABSCESS AFTER RESECTION OF RIBS AND RETROPLEURAL PROCEDURE.

DR. F. LANGE presented a man, forty-four years of age, otherwise healthy, who began to suffer from gastric disturbances

fourteen years ago. One year later, attacks of severe pain, principally in the region of the scapulæ and small of back, would occur, lasting from half an hour to a day. About twelve years ago had dysentery. In October, 1898, jaundice set in with quick emaciation after an unusually severe attack of pain.

January 3, 1899, laparotomy. Incision parallel to free border of ribs. Gall-bladder emptied of gall, mucopurulent material, and some stones. Choledochotomy. Much of a soft, chalky, brownish concretion removed, a great deal of which was shovelled out of the hepatic ducts by a blunt curette. Papilla vateri free. In rear wall of duodenum over vertebral column circumscribed resistance could be felt, probably an old cicatrix. Common duct closed by suture. Gall-bladder inverted about the edges of the wound and drained. Suture of peritoneum. Tight tamponade of abdominal walls on account of free oozing.

For more than one week after the operation oozing from the drainage tube in the gall-bladder continued. Purulent mucus and a great quantity of small particles of soft concretion were admixed with the bile. This, however, gradually ceased, and about eight weeks after the operation the fistulous opening closed, though repeatedly attacks of colicky pain, evidently due to stagnation and retention, now occurred. The constipation with occasional visible contraction of the expanded ascending colon was all the time troublesome. Evidently the action of the gut was hampered by adhesions about the region of the gall-bladder. On March 4 the patient was discharged healed and in convalescing condition. Very soon, however, pain set in again, with rise of temperature and chill. On March 11 pain very severe. Temperature on following day 105.6° F. Three days later a small stone about the size of a pea was discharged with the stools. Patient felt transiently relieved. After about ten days again rise of temperature and occasional pain in right shoulder. No icterus. Stools of normal color. April 2, 1899, readmission, with temperature of over 103°.

April 3, gall-bladder and large ducts exposed. Many adhesions broken. Common duct dilated but apparently not obstructed. Gall-bladder was then removed. Cystic duct closed by suture near its insertion into common duct. The gall-bladder was removed because repeatedly retention of much purulent material had taken place in it, and the fistula had reopened.

Convexity of liver freed from adhesions and explored by touch. A resistant area could be felt about five inches distant from free border. Its puncture with aspirator-needle yielded thick pus.

Abdominal incision supplemented by a transverse one, and about seven to eight centimetres of the next three rib cartilages, including some of their bony portion, resected. Periosteum and perichondrium peculiarly adherent and tedious to be lifted off.

Pleura diaphragmata stripped from the muscular layer of diaphragm and pushed upward. Incision through diaphragm over seat of abscess. Edges of this wound united to liver surface by suture. Abscess incised by actual cautery. It was about the size of a small hen's egg. Tamponade without suture. Operation had lasted very long and patient was much exhausted and collapsed; he, however, rallied under saline infusions, hypodermic injections of camphor, etc.

For several weeks feverish condition continued. Gradually, however, the patient improved, and on the 27th of May the enormous wound was closed with the exception of a small fistula, and patient was discharged.

In August, 1899, he went to Carlsbad, spent the winter of 1899 and 1900 in favorable climates, mostly on the border of the Geneva Lake, and he went again to Carlsbad in June, 1900.

His condition is now quite satisfactory. He has his original weight, attends to his business, and feels strong and healthy. Jaundice has never recurred. Inclination to being constipated still exists, and from time to time patient will have over the lower part of his chest a somewhat painfully oppressive feeling, which, however, soon passes away. The difference in weight between the extreme degree of emaciation and his present weight is more than seventy pounds. He had at one time come down 112 pounds.

Dr. Lange thought this case was of interest for the following reasons:

(1) The morbid tendency to oozing caused by the cholemic condition of the blood, though alarming after the first operation, and usually and justly also, after his personal experience, regarded as a most serious complication, was gradually overcome with the cessation of stagnation of bile.

(2) The liver abscess seems to have been the only one, an



uncommon thing in cases where its formation is due to gall-stone disease and cholangitis.

(3) The procedure for successfully approaching the abscess aggravated, no doubt, the operation, but allowed of safely dealing with the abscess.

(4) In this case, like in several others, he had observed that cholangitis has gradually disappeared. Such cases may go on with slight feverish actions for many months, and gradually heal. Nay, he was inclined to assume that small abscesses in the gall system may be discharged through the gall-ducts and spontaneous recovery take place. Carlsbad seems to act well on such cases.

DR. A. J. MCCOSH said that in connection with this subject of cholecystotomy and cholecystectomy, he wished to mention the operation devised by Dr. William J. Mayo. The speaker said he had done Mayo's operation three times, and had in two of the cases found it exceedingly satisfactory. In both the mucous membrane of the gall-bladder could be peeled off very easily, but in the third case it was brittle, and could be removed in small pieces only by forceps, so he abandoned the operation and extirpated the gall-bladder.

DR. WILLIAM J. MAYO, of Rochester, Minnesota, said that in nine cases of stricture of the cystic duct he has been able to remove the mucous membrane down to the point where the obstruction existed, and in that way was able to get rid of the collection of mucus. In five cases he was compelled to remove the whole gall-bladder, as it was impossible to get the mucous membrane out. It sometimes can be peeled off very readily, and this obviates the risk and danger that accompany removal of the gall-bladder.

DR. B. F. CURTIS said the method of procedure employed by Dr. Lange in his case was of considerable interest. In a somewhat similar case which came under his observation some years ago, the speaker said he resected a rib, exposed the pleura, sutured a circular area of the latter to the diaphragm so as to close off the pleural cavity, and then cut through the diaphragm; after shutting off the peritoneal cavity with a strip of gauze placed circularly around the wound between the liver and diaphragm, he evacuated the abscess. Dr. Lange was able to simplify this method by pushing up the pleural fold.

The preferable line of the abdominal incision in these gall-

bladder cases is another point worthy of discussion. Many have raised objections to the oblique incision along the edge of the ribs on account of the danger of injury to the upper muscular nerves resulting subsequently from hernia, but in Dr. Lilienthal's case, where this incision was made, there are no signs of a hernia, nor are there any in Dr. Lange's case, in spite of his second incision.

DR. LILIENTHAL said the operation of cholecystectomy bore a certain analogy to that of appendicitis; just as in certain cases of appendicitis it is impossible to get the organ out entire without spending a great deal of time and running much unnecessary risk, while it can be readily eviscerated, so it is in operating on the gall-bladder. If the gall-bladder comes out easily, it should be removed; if there is difficulty about its removal, other methods, such as the evisceration of its mucous membrane, must be resorted to.

As to the incision, Dr. Lilienthal said he did not make his incision along the free border of the ribs. It is made at a slight angle, but almost parallel with the border of the rectus; the rectus is then drawn inward towards the median line after the manner suggested by Dr. Weir in appendicitis, making the incision through the upper parts transversely. Then, if necessary, the rectus is partially cut in its upper portion. The speaker said he had resorted to this method in quite a number of cases without a resulting hernia.

DR. WILLY MEYER said that in a number of cases of gall-bladder disease which had come under his care he had not experienced any special trouble in cutting out the gall-bladder, no matter how large it was. In those cases where it is adherent to the liver tissue the danger of hæmorrhage can be obviated, to a great extent at least, by using the Paquelin cautery. One must, of course, avoid entering the liver tissue.

As regards the choice of an incision, Dr. Meyer said he preferred to make it parallel with the border of the ribs. This has never resulted in a hernia, so far as he knew. It is better to make this incision and push the belly of the rectus muscle inward, then dividing transverse fascia and peritoneum in the direction of the cut according to Weir's method, than to make the entrance through the rectus muscle in the direction of its fibres.

DR. F. KAMMERER referred to one case of subphrenic abscess which he opened after resecting some of the costal carti-

lages and ribs, pushing up the pleura and perforating the diaphragm. In this case the pleural cavity contained quite a quantity of serous fluid, which gave rise to some doubt as to diagnosis, one physician getting clear serous fluid and the other pus on puncture. At the operation the lower border of the pleura was easily recognized and pushed away for an inch or so, without opening it. Where such a procedure is possible, it is certainly preferable to opening the pleura and risking an infection of its cavity.

### CARCINOMA OF TEMPORAL REGION.

DR. WILLY MEYER presented a woman, eighty years old, from whom he had excised an ulcerating carcinoma in the right temporal region, which involved the skin and periosteum and also the right upper eyelid. After thorough excision of the diseased tissues, including a great part of the periosteum of the frontal bone, the denuded area was covered with skin grafts by Thiersch's method. The grafts, which were taken from the patient's thigh, produced an excellent cosmetic result.

### WIRING OF FRACTURED PATELLA.

DR. MEYER showed three patients upon whom he had operated for fractured patella. In two of these he had wired the patella,—a third patient, whose patella also had been wired, failed to appear,—while the fourth was treated by the conservative method. The first patient was a man, thirty-five years of age, who had broken his patella in jumping from his wagon. Elastic compression was applied over the knee-joint until the sixth day; then the fragments were united with two large-sized silver-wire sutures. The patient was allowed to walk during the sixth week. He now has the full use of his limb and is able to bend it to an angle of 60°. There is complete bony union.

The second patient was a man, twenty-eight years old, who in January, 1900, slipped and fell on his flexed knee, breaking the patella. The capsule was well preserved. This case was regarded as a favorable one for the conservative treatment. It was first treated by elastic compression, with the application of a posterior splint, and tapping, followed by massage. Functionally, the result was better than that obtained in the first case. The patient has the full use of his limb, but there is no bony union,

the fragments being separated by at least one-eighth of an inch.

The third patient shown by Dr. Meyer was a woman, twenty-three years old, who fell and sustained a comminuted fracture of the left patella. On February 12, 1900, twelve days after the accident, the joint was opened. The small lower fragment was splintered, and a loose spiculum of bone was found between the two fragments. The fragments were wired as well as it could be done. At the patient's discharge from the hospital she was instructed to continue exercising the limb, but she neglected to do this, and she is now only able to bend it to an angle of  $110^{\circ}$ . She has, however, the full use of the limb, and there is complete bony union. With proper exercise flexion can certainly still be materially improved.

In the fourth case reported by Dr. Meyer, the fragments were also wired with very satisfactory results. The impression he had from his operations was that certain local conditions of the fragments must prevent proper coaptation and consolidation. These are: the marked difference of the size of the fragments; the fact that the fracture often is a comminuted one, with small fragments of bone interposed in the line of juncture; the turn of the lower fragment around its transverse axis, its fractured surface pointing directly outward; the almost always present intervention of anterior capsular fibres. Wiring restores the bone to perfection and thus insures best against refracture. It appears to be the best treatment of these cases. It is best done at the end of the first or during the second week after the occurrence of the fracture.

DR. LILIENTHAL said he did not believe in wiring the fractured patella. When it is wired, why should a patient be kept off his feet for six weeks, or even four weeks, if the wound is closed. Why should passive motion not be begun at the end of ten days and the patient be allowed to get up? The speaker said he thought the trouble in most cases was that the joint was not used soon enough, and consequently adhesions formed. Bony union is not all that we are after in these cases. We can get bony union and have a perfectly stiff leg. What we want is the restoration of perfect function. By treating these cases of fractured patella by massage, we get the patient out of bed on the eighth day, and he has the use of the limb from that time on.

This method gives a better functional result than that obtained in any of the cases shown by Dr. Meyer. In certain cases of compound or open fractured patella, Dr. Lilienthal said, the fragments should be wired.

DR. GEORGE WOOLSEY said that a certain class of cases of fracture of the patella, like the second one shown by Dr. Meyer, where the patient fell directly upon his flexed knee, are favorable ones for any method of treatment. There is another and larger class in which the functional result is more important than the kind of union obtained, and fibrous union is preferable to imperfect function.

Dr. Woolsey said he thought both methods of treatment should be submitted to the patient, and he should be allowed to choose between them.

DR. ALEXANDER B. JOHNSON said he was inclined to the opinion that better functional results were obtained by suturing the patella than by conservative treatment. A functional result not only applies to mobility, but also to strength, and certainly by suturing we get a much stronger patella than by treating such a fracture conservatively.

For the purpose of suturing the patella, Dr. Johnson said he preferred heavy catgut to silver wire. The speaker said he agreed with Dr. Lilienthal that passive motion should be begun very early, usually at the end of ten or twelve days, but not active motion and not motion in the line of flexion or extension of the knee, but lateral motion of the patella over the condyles of the femur; this, the speaker thought, prevented delay in the restoration of function. Dr. Johnson said he did not believe in passive motion, flexion, and extension, performed by the surgeon. At the end of six weeks the patient is permitted to go with the knee encased in a crinoline bandage, and gradually he is allowed to resume his ordinary occupation.

Although, after suturing the patella, the joint may be rather stiff at the end of six weeks, its function is gradually restored, and in the majority of cases, at the expiration of a year, there is strong bony union and practically normal function. To a laboring man, strong bony union is very important.

DR. ROYAL WHITMAN said he agreed with Dr. Johnson that the possession of a perfect range of motion in a joint is not synonymous with perfect function. In those cases of fracture of

the patella in which there is separation of the fragments, the patella will not move smoothly over the surface of the femur, and function is thus directly impaired, in addition to the loss of muscular power caused by the elongation.

DR. MEYER, in closing, said he waits until the beginning of the second week before suturing the fractured patella, in order to allow the effects of the traumatism, the bruising, etc., to pass off, to avoid possible suppuration.

The speaker said he thought bony union was preferable to fibrous union, as the former left a stronger and more useful joint. It is a fact that patients with ligamentous union of one patella often fracture the other one. The patients he had presented could possibly have been safely discharged at the end of four weeks instead of six. His object in keeping them in bed two weeks longer was to give the fragments sufficient time to unite firmly.

#### REMOVAL OF THE GREATER PORTION OF THE STOMACH FOR MALIGNANT DISEASE.

DR. F. KAMMERER showed two cases in which he had removed the greater part of the stomach for malignant disease. The first patient was a man, thirty-one years old, who had been ailing for the past eight months. He presented himself at the hospital with a history of gradually increasing obstacles at the pylorus. A tumor as large as a fist, fairly movable, filled the epigastrium. The patient had a very cachectic appearance. The chemical examination of the stomach showed no hydrochloric, but considerable lactic acid. After opening the abdomen the tumor was seen to occupy the pylorus, the entire lesser curvature, reaching to the cardia at this point, the antrum pylori, and about half of the stomach itself. The removal of this mass was effected by the use of Kocher's clamps after ligation of the great and lesser omentum. A few infiltrated lymphatics were removed lying near the lesser curvature. The divided ends of the stomach and duodenum were closed with two rows of silk sutures (running); and a posterior gastro-enterostomy was done with the Murphy button. The greatest difficulty was experienced in suturing the stomach at the cardia, the whole of the lesser curvature having been removed. The patient made a good recovery, and has gained about twenty pounds in two months. The button passed on the seventeenth day.

The second case was that of a man of forty-five years, who had been ailing for four months. When first seen he had a tumor of the size of an egg in the right hypochondrium. At the operation, the pylorus, lesser curvature, but not quite so much of the stomach as in the previous instance, were involved. The head of the pancreas had to be separated from the duodenum to a slight extent in order to clamp the latter, where it was still apparently sound. The steps of the operation were as in the first case, a posterior gastro-enterostomy concluding the same. The button was passed on the tenth day, and the patient made an untoward recovery.

The speaker had of late done three farther-extended resections, which had unfortunately ended fatally. In one case death ensued on the twelfth day from one of those unfortunate occurrences, failure to remove a gauze tampon from the abdominal cavity, after perfect union had taken place, as the autopsy showed. Another case unfortunately died of pneumonia on the sixth day after an ether narcosis of slightly more than three hours; and the last case, in which a large portion of the transverse mesocolon and the head of the pancreas were removed, ended fatally on the third day from prolonged shock.

The first of these deaths cannot be attributed to the operative procedure itself. The last two were indirectly due to the same, but it should be said that careful examination after death showed that all the sutures had held and no leakage had occurred. In all cases infection of the peritoneum was avoided.

Dr. Kammerer, in reply to a question as to what degree glandular involvement had taken place in the cases he had presented, replied that in both cases there were a few enlarged glands, which he had removed.

#### MULTIPLE PAPILLOMATA OF THE BLADDER; EX- TIRPATION BY TRANSVERSE INCISION . THROUGH THE SYMPHYSIS PUBIS.

DR. LANGE presented a man, fifty-one years old, on whom this operation was done on the 9th of March.

Commenting upon the case, he said that the removal of growths from the cavity of the bladder in stout and fleshy men offers a great deal of difficulty. Through the usual longitudinal incision such operation is hardly feasible in an exact manner.

The incision must be very long; and even then the thick abdominal walls cannot be pulled sideways sufficiently to give easy access to the deep-seated field of operation. It becomes necessary to sever the insertion of the recti, and this again has the disadvantage of a wider scar, predisposing to the formation of hernia. The same objection must be made to Trendelenburg's transverse incision above the pubes. It is hardly possible, in stout men at least, to unite again the recti muscles with such certainty that union is to be expected, since sutures, even thick ones, will cut through the cut edge of the retracted muscle and its fascial sheath, either right away under the heavy traction that is necessary to pull the powerful retracted muscle down, or as the result of vomiting or restlessness of the patient later on. Dr. Lange has therefore resorted to a modification of the Trendelenburg incision after his experience with the analogous modification of Bardenheuer's transverse incision for the removal of large tumors with broad attachment in the depth of the pelvis. This modification consists in chiselling a thin shell of bone with the attachment of the recti. It must be remembered that the insertion of the recti is not only the crest of the pubic bones, but also a portion of their anterior surface. The broad chisel to be used is to be directed accordingly. The bony substance thus left with the recti will stand any amount of traction by suture, and allow of a very solid union with the body of the pubic bone. The bladder is to be opened likewise by a transverse incision, and if drainage of the bladder should be desirable, the same must be done through the right or left or both angles of the wound.

For the removal of large pelvic tumors this incision must be carried sideways as far as necessary to give easy access. Dr. Lange has in this way successfully dealt with cases which had been regarded as inoperable by others. One gets comparatively easily and soon to the large vessels of the uterine plexus, and though the ventral incision may take more time and be more bloody, this disadvantage is made up by the safety of the work in the deep regions and the possibility of seeing better what one does. An additional longitudinal median incision may be of service. One will also be able to avoid with more certainty the ureters and remain outside of the peritoneal cavity for the greater part of the operation in those cases where large tumors with



broad insertion have lifted the peritoneum off from the anterior abdominal wall. The bladder must be cautiously dealt with in such cases. It may occasionally remain as a bag, freely detached, except in the region of the fundus and internal orifice.

The patient presented was unusually stout and fat, his weight being about 240 pounds. An unforeseen occurrence during the operation was the tearing off of the periosteum in a fit of coughing, after the insertion of the recti had been severed to a small part only.

A large villous growth occupied the floor of the bladder to the left, not far from the ureter, backward of it. Several smaller ones were removed from the neighborhood of the orificium internum, and besides that a large number of small grain-like protuberances were burned by the actual cautery. The larger masses were removed by the galvanocautic snare. Several larger vessels had to be tied, not without difficulty.

It may be of interest that during the after-treatment regular injections of nitrate of silver were kept up according to the proposition of Herring. Dr. Lange had expected from the macroscopical appearance of the bladder at the operation a speedy recurrence. A cystoscopical examination six days ago revealed, however, a very satisfactory state of affairs. The bladder shows everywhere a smooth, whitish surface, except about the region of the prostate and internal orifice, where a certain degree of injection betrays some catarrh. The openings of the ureters are normal. The one on the left side decidedly smaller than the right one, perhaps in consequence of cicatricial contraction in its neighborhood. Here the large tumor had been removed. The bone scar is perfectly firm, as it had become in all the other cases he had operated after this method. In this case alone a small fistula exists which will discharge a drop of pus every few days. It leads down to one of the threads of silkworm gut, but does not give any annoyance. The injections of nitrate of silver are kept up once a week.

The union of the bony surfaces was usually effected by four silkworm threads, and the pubic bones have to be perforated, of course, by drilling for said purpose.

Dr. Lange, in reply to a question, said that the pathologist to whom the tissue removed from the bladder was submitted for examination reported that it contained carcinomatous elements.

Thus far, however, there are no signs of a recurrence. From a clinical stand-point, Dr. Lange said, he was inclined to doubt the malignant nature of the growth. There is a kind of papillomatous growth of the bladder which after its removal is strongly suspicious of a malignant growth.

DR. WILLY MEYER referred to a case in which he was called upon to remove a papilloma of the bladder of ample size, and resect with it a portion of the vesical end of the ureter. Patient made a good recovery, and did not develop kidney complications. The microscope showed carcinoma at the point of insertion of the tumor. There was a recurrence after two years, when the bladder was found to contain numerous growths (from sixteen to twenty), which the pathologist pronounced to be truly cancerous. There was another period of comparative immunity lasting eighteen months, when a stone had to be crushed in the bladder. In the mean time, the man's wife had contracted cancer of the uterus and died. Five and a half years after the first operation the bladder was opened for the third time. The case was then found to be inoperable. The patient died six months later.

### LONG-LASTING IMMUNITY AFTER EXCISION OF CARCINOMA OF THE BREAST.

DR. CHARLES N. DOWD, in accordance with the suggestion of the President of the Society, last spring, that members should show some of the cases who have lived for many years after having had cancers excised, at the last meeting had shown a man who was operated on five years before for an epithelioma involving the entire lower lip, and who showed no signs of a recurrence. He now showed three patients who were operated on seven and one-half, five and one-half, and four and one-half years ago, respectively, for carcinoma of the breast, and who have remained free from a recurrence.

The first patient was a woman, sixty-two years old, who was operated on June 23, 1893, for a tumor of the left breast which was first noticed about six months before, and had gradually attained the size of a hen's egg. It was not attached to the skin or fascia, and there was no evident axillary involvement. The breast was removed by Volkmann's method, and the axilla was cleaned out. The pathologist reported that the growth was a carcinoma of the scirrhus type. The patient made an unevent-

ful recovery, and has remained well up to the present time, with the exception of the development of a spot of leukoplakia on the tongue, which showed no malignancy on microscopical examination.

The second patient was a woman of forty-five, who was operated on May 16, 1895, for a recurrent nodule in the scar of a previous operation on the right breast. The nodule had first been noticed seven months before, and had been removed by another surgeon a month later. There was an indurated area about the scar, and there were enlarged lymph nodes in the axilla which subsequently proved to be carcinomatous, with areas of coagulation necrosis. The Halsted operation was done in this case, and the woman has remained entirely free from recurrence.

In the third case, the growth, which was very extensive, was removed on April 27, 1896. Seventeen months before, the patient had first noticed a small nodule in the right breast, and five months later it was removed by another surgeon under cocaine. It quickly recurred, and was removed under chloroform four months previous to her admission to the hospital. It again recurred, growing very rapidly, and was slightly painful. When Dr. Dowd first saw her there was an inflamed and indurated mass about the size of a small orange on the right side of the chest, extending from the second to the fourth ribs, and two and one-half inches outward from the junction of the ribs and cartilages. It was very firm and seemed to be closely attached to the chest wall. The glands in the axilla were involved. Halsted's operation was done, a large area was skin grafted, and the woman has remained free from all signs of a recurrence.

DR. CURTIS said it was rather interesting to note that the first patient shown by Dr. Dowd, upon whom the older operation of Volkmann had been done without removal of the pectorals, had remained entirely free from a recurrence. It showed that it was unnecessary in every instance to do the extreme radical operation.

## SECONDARY OPERATION FOR DEFORMITY FOLLOWING FRACTURE AT THE WRIST.

DR. ROYAL WHITMAN presented a boy from Texas who several months ago had fallen, injuring his right wrist, and when he came under Dr. Whitman's observation the hand was

fixed in the position of dorsal flexion. In order to correct the deformity the joint was laid open, the lower end of the radius was chiselled off and pushed forward into its natural position. The deformity was thus entirely corrected. The boy can now bend the wrist and move his fingers, and in time a complete cure will probably take place.

## STRANGULATION OF THE BOWELS OPERATED ON UNDER SPINAL ANÆSTHESIA.

DR. JOHN F. ERDMANN reported this case and exhibited the specimen removed. The patient was a woman who had a large ventral hernia, resulting from an operation done some years ago. When the patient was brought to the hospital the hernia was irreducible, and there were symptoms of strangulation of the gut. Twelve minims of a 2 per cent. solution of cocaine were injected into the spinal canal between the third and fourth lumbar vertebræ. Within seven minutes after the injection anæsthesia was complete, and the operation, including excision of twelve inches of gangrenous gut with an end-to-end anastomosis, was successfully performed. There was a complete torsion of the coil of intestine which filled the hernial sac. During the first five minutes of the operation there was considerable vomiting, but after that there was no disturbance whatever, and the patient did not complain of pain.

DR. KAMMERER asked if tying off the sac or pulling upon the peritoneum had given rise to any pain.

DR. ERDMANN replied that the patient evinced absolutely no signs of pain while he was handling the abdominal contents.

DR. KAMMERER said that he had attempted this method of anæsthesia in thirty-two cases, many of them cases of inguinal hernia. In most instances the patient complained of some slight pain when the sac was pulled upon or tied. The speaker said he thought such cases as the one under discussion were adapted to this form of anæsthesia. He had employed it in one case of strangulated hernia in a man seventy-one years old, whose condition at the time of operation was so poor that a general anæsthetic would probably have proved fatal. By means of the spinal anæsthesia he was able to relieve the strangulation. The man made an excellent recovery.

DR. ERDMANN said he did not complete the operation by repairing the wall, as the woman had an immense ventral separation, which he hoped to close at a future time.

[This was done three days later under ether anæsthesia, with a perfect recovery.—J. F. E.]

DR. CURTIS asked if local anæsthesia could not be employed just as safely, or more so, in these cases than spinal anæsthesia. Under local anæsthesia we can perform gastrostomy, enterostomy, and even cut down on the kidney and excise its capsule without any danger of fatal cocaine poisoning or shock. The speaker thought it questionable whether spinal anæsthesia should be given preference to local anæsthesia in cases where the patient's low vitality was the reason for rejecting general anæsthesia.

DR. ERDMANN said it was not his idea to give preference to spinal anæsthesia over other methods. This case of strangulation of the gut which he had reported was the first in which he had ever been able to use so small a quantity of cocaine; that formerly it required from fifteen to forty minims injected into the operation area to produce sufficient anæsthesia to operate, and even with such an amount anæsthesia of the mesentery and gut (in this, the former method) was not complete enough to stand handling, as is necessary in excision.

DR. KAMMERER said he thought that spinal anæsthesia, if it is to be used at all, is especially indicated in these abdominal operations. Of course, the full value of this method can only be determined after a more extended experience with it. In the class of cases referred to, it certainly seems to be preferable to local anæsthesia. The speaker said his own experience in the latter method was not very encouraging in abdominal cases.

# TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

*Stated Meeting, May 7, 1900.*

The President, DE FOREST WILLARD, M.D., in the Chair.

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## A MODIFIED HEAD-BRACE EXTENSION AND A BRACE FOR LATERAL CURVATURE.

DR. J. M. SPELLISSY presented improved braces as indicated in the title, and demonstrated their use on patients. For the paper describing the appliances, see page 185.

## CASES OF COMPOUND OR COMPLICATED FRACTURE ILLUSTRATING THE VALUE OF OPERATIVE INTERFERENCE IN THE TREATMENT OF THESE INJURIES.

DR. H. R. WHARTON read a paper with the above title, for which see page 171.

DR. HUNTINGTON, of San Francisco, said that through the kindness of Colonel Girard, Chief Surgeon at the United States General Hospital at San Francisco, he had been able to inspect a large number of gunshot fractures, and had been deeply impressed by this consideration,—that a very considerable amount of loss of tissue may be sustained without succeeding material deformity after repair has taken place, or, in other words, a large amount of interspace may be expected to be filled in efficiently during the process of repair. He recalled one case in which a Mauser bullet carried away nearly one-half of the femur for a distance of two and one-half inches, fracturing the bone completely. The remaining portion of the bone was comminuted, so it was doubtful if there were more than two-fifths of the circumference of the femur which were brought into apposition with its opposing fragment. In that case the result, after some four months, was almost perfect.

DR. JAMES E. MOORE, of Minneapolis, said that plaster of Paris was in great favor with the Western surgeons as a fixation agent. Where the patient is under the immediate control of the surgeon the plaster of Paris is not infrequently applied at once. Where he is not under immediate control, or where he is not seen immediately after the accident and until after swelling has taken place, he is cared for very much as he had seen them cared for in the hospitals in Philadelphia, until the swelling has gone down, then the plaster-of-Paris dressing is applied. There is no question but that the operative treatment in many cases of fracture is the only proper treatment. One of his colleagues at the present time was making a series of experiments bearing upon the possibility of injury to the nerve supply of some of the long bones as a causative factor in non-union or delayed union. His experiments, however, are not yet complete, although he has given verbally some very strong evidence pointing towards that as a cause for non-union.

DR. WHARTON remarked, with reference to the case of comminuted fracture in which a large fragment had been retained, that in many cases of comminuted fragments he would have removed them all and have gotten marked shortening, but here, where he had one large fragment, he thought he could reduce the shortening by wiring, and he felt justified in making the attempt. He thought that in this case he would eventually get a useful limb by having a plaster-of-Paris bandage put on, and allowing him to go around as they do in the ambulant treatment; that is, by walking in the plaster bandage, or by having the brace adapted so that a certain amount of weight can be brought to bear on the limb and a certain amount taken off the limb at the seat of fracture by means of the brace.

With regard to the method of fixation in compound fractures, he was not at all wedded to the silver plate. In the larger number of compound fractures in which he secured fixation by suture, it was by means of heavy silver wire. By applying more than one heavy silver-wire suture one can get as good fixation as by the silver plate. In using the plate, the screws, unless very carefully made, are apt to have the heads turn off or split. A mistake in using the silver wire is in not using it heavy enough in order to stand a certain amount of strain.

With regard to the question of compound fractures involving

the joints, he agreed with Dr. Allis that in a majority of cases the functional result would be better if operative methods were adopted. He was not able to agree with him as to the advisability of operating in patients suffering from intracapsular fractures of the femur, for such operations would be followed by a very heavy mortality; but in younger patients, and in some other joints, operation would be followed by much better results as regards the function of the limb.

## INSTRUMENT FOR FACILITATING THE ANASTOMOSIS OF HOLLOW VISCERA.

DR. M. O'HARA, JR., presented a new forceps for use in intestinal anastomosis, describing them and their use in a paper, for which see page 179.

DR. LE CONTE said that through the courtesy of Dr. O'Hara that day, he had used these forceps on a case of tubercular peritonitis which, after an operation a year ago, developed a fæcal fistula in the line of the incision. After freeing up the adhesions, he found the perforation in the bowel to be over two inches, necessitating a resection of the ileum. The rapidity and ease with which the forceps were used was surprising, and the time consumed in resecting the gut and making an end-to-end anastomosis was probably not over five or six minutes. He could fully bear out all the claims Dr. O'Hara made for the instrument, and he called attention particularly to the simplicity of the forceps, their easy application, and the impossibility of leakage while the anastomosis is being done.

DR. HUNTINGTON said that he would hesitate to make end-to-end anastomosis between the small and large bowel by attempting to close a portion of the large bowel and then attaching the small bowel to the resulting aperture. There is a fault in that procedure that does not, however, minimize the value of the instrument. He personally did not approve of the metallic button, and believed, if accurate statistics of the operations done by the Murphy button throughout this country to-day could be furnished, surgeons would have a list of tragedies that would be appalling. He had used it fourteen times, and if he included one which was reported six days after the performance of the operation, and since he left home, as being probably a success, he had but two successes to record.



DR. DAVIS remarked that the question of time in doing an anastomosis with this instrument as compared with that of the Murphy button had been raised. It seemed to him that it was perfectly easy to decide the relative time consumed by comparing the two procedures. In the first place, with the Murphy button, it is required to place the two ends in place and fix each with a purse-string suture. That would take probably longer than the clamping of these two forceps to the gut. In the second place, the Murphy button is usually reinforced by Lembert's sutures around the button. If that is done, then it is a question of surrounding the entire circumference of the gut by Lembert's sutures. That is all Dr. O'Hara does.

The gut being the same in both instances, the time consumed in applying the Lembert's sutures around the gut in both the Murphy button and these forceps would be approximately the same. Therefore, if the button was applied with a single row of sutures, and if Dr. O'Hara only used a single row of sutures in his operation, then it would appear that both operations could be done in the same time. In other words, it would take no longer to make the operation with Dr. O'Hara's forceps than it would take with the Murphy button reinforced with a single layer of Lembert's sutures.

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*Stated Meeting, June 4, 1900.*

The President, DE FOREST WILLARD, M.D., in the Chair.

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### TUBERCULAR PERITONITIS; RECOVERY AFTER ABDOMINAL SECTION; FÆCAL FISTULA.

DR. ROBERT G. LE CONTE reported the following case: An Italian woman, aged seventeen, was admitted to the Pennsylvania Hospital on December 15, 1898. She had complained for more than two years of abdominal pain, associated with increasing fulness and swelling of the abdomen, and accompanied by general debility and anæmia. Family history negative, and her previous

history negative, except that she had always been pale and sallow. The abdomen was large and tense and filled with fluid. The heart, lungs, and urine were negative to examination. Two days after admission the abdomen was tapped and ninety-four ounces of clear, straw-colored fluid withdrawn. Slowly and gradually the fluid reformed in the abdomen, so that by February 6, 1899, she was again greatly distended. She was again tapped, and 220 ounces of clear fluid withdrawn, of 1020 specific gravity, and containing a few leucocytes. A blood count at this time showed red corpuscles 5,600,000, white corpuscles 50,000, hæmoglobin, 60 per cent. By February 25 the abdomen was again considerably distended. The patient was etherized and the abdomen opened in the median line below the umbilicus. The peritoneum was much thickened, and an encysted cavity, extending from the umbilicus to the uterus, was opened. This contained fluid and cheesy material. The intestines were densely adherent around the cavity and covered with tubercular nodules. These adhesions were broken up, the abdomen was irrigated and closed with drainage. Two days later the drainage tube was removed. The drainage tract persisted, discharging a small amount of pus, and on March 10 it was dilated and a considerable amount of pus and caseous material escaped. A drainage tube was then reinserted. Up to this time the patient had been steadily losing in weight, but now a slight improvement began, and she gained slowly. May 1 a blood count showed the red corpuscles 3,480,000, white corpuscles 8000, hæmoglobin, 60 per cent. The sinus still persisted and discharged pus. May 20 the discharge from the sinus became offensive, and on June 5 the discharge changed to dark-yellow fluid with a marked fæcal odor. June 8 a large round worm was passed from the sinus with some fæces. From June, 1899, to February, 1900, the patient remained in about the same condition, neither gaining nor losing much in weight. For the greater part of the time she was in bed, but some days she would be up in a wheel-chair. The sinus persisted, discharging from time to time small amounts of liquid fæces. At this time the patient came under Dr. Le Conte's care. Her weight was sixty-five and a half pounds and she was a most miserable-looking object. In a few days the sinus began to enlarge, and on February 10 something could be felt at the bottom. A pair of forceps was introduced and a piece of gauze about five feet long and a yard wide was

removed. The large cavity that remained soon filled with fæces, and the entire intestinal contents were discharged through the abdominal wound, none being passed by rectum. As a result the skin about the wound soon excoriated, and her suffering from dermatitis was considerable. The patient's condition was such that operation was out of the question. The first week in March she passed some fæcal material by the rectum, which gradually increased in amount, although the larger part was still passed by the abdominal wound. Her condition then began to improve, and she commenced to gain in weight. May 4 the blood count was red corpuscles 4,880,800, white corpuscles 20,200, hæmoglobin, 57 per cent. May 7 the patient was etherized and the sinus was cleaned, curetted, and packed with sterile gauze. The skin of the abdomen, which was still excoriated, was then cleaned as thoroughly as possible, and an elliptical incision made, so as to include the sinus and all of the old scar-tissue. On reaching the transversalis fascia, dense, thick fibrous tissue was encountered, extending three inches or more to the right, and the same distance to the left of the median line. After considerable difficulty this fibrous mass was separated from the abdominal wall. The condition present may perhaps best be described as follows: A cavity of irregular outline, varying from two to three inches in diameter, surrounded by thick, dense, almost cartilaginous, fibrous tissue, and communicating by a large opening with the small intestine. This fibrous sac was surrounded above, on each side, and behind by adherent bowel, in front by the abdominal wall, and below by the fundus of the uterus, and both tubes and ovaries. Except a small portion of the sigmoid flexure which was adherent on the left side, the remaining adherent bowel was all small intestine. These adhesions formed a series of loops in the small intestine varying from a few inches to perhaps a foot or more in length, simulating more or less a rosette formation. Where the bowel was sharply kinked or flexed in the short loops, these surfaces showed a few small tubercles, but for the rest the peritoneum was free from any evidence of tubercular disease. After freeing the sac from all adhesions, an undertaking which required considerable time, it was found necessary to remove both tubes, the left ovary, and part of the right. The opening into the small bowel was two and a half inches long by half an inch wide. The portion of bowel opposite the mesentery had simply disappeared, and

a closure of the rent by suture was impossible. A resection of four inches of intestine was therefore done, with an end-to-end anastomosis. Dr. O'Hara's intestinal anastomosis forceps were used, and the time consumed in doing the resection was about five or six minutes. The abdominal cavity was then thoroughly wiped out and irrigated with hot salt solution, and as much of the solution as possible allowed to remain in. The abdominal wound was closed without drainage. Time of operation two hours and ten minutes. Although no blood had been lost, the patient was profoundly shocked, and two hours later the pulse was so weak and rapid it could not be counted. The median basilic vein was opened and three pints of normal salt solution thrown into the circulation. The pulse immediately became stronger and less rapid. From then on the convalescence was uneventful. The stitches were removed on the tenth day and the wound found perfectly healed, and on the twenty-first day the patient was out of bed. Her weight at present is seventy-seven pounds.

Dr. Le Conte called attention to the part taken by the gauze sponge, left in the abdominal cavity, in the cure of the tubercular peritonitis. To his mind the necessary irritation of the peritoneum produced by the sponge was the important factor in the cure of the peritonitis, and while the gauze brought on a dreadful chain of evils, it in reality cured the patient.

DR. G. G. DAVIS said that he operated on a case a few months ago of tubercular peritonitis; the peritoneum was found to be studded with tubercles everywhere, and was full of purulent material. The abdomen was washed out with salt solution and the incision closed. The condition of the patient was a little improved, but he afterwards died. The idea of additional irritation by gauze strips is perhaps worthy of a trial. In other words, if one opens an abdomen affected with tubercular peritonitis instead of simply closing it—after washing it out—would it not be wiser to insert gauze in various directions through the incision and then remove these strips of gauze afterwards? It would probably set up this very inflammatory process, which, in this case, would prove a constructive instead of a destructive one.

## THYROID CYST.

DR. ROBERT G. LE CONTE presented a man, aged twenty-seven years, who about four years ago noticed a slight swelling on the left side of the throat, which gradually increased in size until this winter, when the growth was very much accelerated. About that time—four or five months ago—he began to have some difficulty in respiration and considerable trouble the moment he laid down. He also had some slight difficulty in swallowing, and there was a slight huskiness of the voice. The growth was situated on the left side, extending from the hyoid bone to beneath the clavicle, and from a little beyond the median line to the outer border of the sternomastoid muscle. The skin over it was tense, but in no place adherent, and the growth felt cystic in character. He was admitted to the Pennsylvania Hospital on the 17th of May; he was etherized on the 19th, and Kocher's angular incision made. The superficial veins were tied, and the capsule of the gland was exposed. It was then found that the sternothyroid muscle had to be cut at its insertion into the thyroid, to deliver the tumor. The capsule was freed as far back as the inferior thyroid artery, the gland dislocated forward, incised, and the tumor enucleated. The wound was closed without drainage. The stitches were removed on the eighth day, and the man has had a perfect recovery. The growth is a cyst.

PERFORATING GASTRIC ULCER SIMULATING  
APPENDICITIS.

DR. RICHARD H. HARTE reported the following case. A man, thirty-one years of age, was admitted to the Pennsylvania Hospital, stating that he was perfectly well up to the day before admission, when he was taken with sharp abdominal pains. There was no vomiting or diarrhoea. He was treated at home, but the pain became worse, so that the ambulance was sent for and he was taken to the hospital. When seen his temperature was slightly elevated, features pinched and anxious, tongue coated, and he complained greatly of abdominal pain. On examination, the abdomen was slightly distended, very hard, and there was a great deal of muscular rigidity and exceeding tenderness on slightest pressure. The point of tenderness was decidedly over the region of the appendix.

With this imperfectly elicited history, the diagnosis of perforated appendicitis was made and an operation advised immediately. In less than an hour from the time of his admission he was etherized and an incision made over the region of the appendix. Immediately on opening the peritoneal cavity there escaped a considerable amount of gas, together with considerable yellowish fluid containing flakes of organized lymph. There were no adhesions to speak of. The appendix was soon exposed and a small ulcerated portion at its extreme tip was found; otherwise it seemed fairly normal. It was ligated and excised, and the abdomen thoroughly flushed with hot normal salt solution and a two-way drainage tube introduced and the wound closed. During the operation the patient's condition was almost *in extremis*. The tube was flushed out frequently, and on the next day the patient expressed a certain amount of relief; the pain was greatly diminished; but he had frequent attacks of vomiting of dark-reddish material which unquestionably was blood. The diagnosis was then made of ruptured gastric ulcer, causing the peritonitis from which the patient was suffering rather than the primary trouble in the appendix. These symptoms lasted for the next forty-eight hours, when the abdomen became much distended, the pulse failed, and the patient died. A post-mortem examination was made through the abdominal wound, and with difficulty the stomach was removed and several small ulcers were found, one of which had perforated. Everywhere else in the abdominal cavity there were evidences of peritonitis. The stomach contained a considerable amount of bloody mucus.

From this case the reporter drew some practical deductions: First, in the matter of diagnosis, the history was misleading, the patient stating that he had never suffered from any gastric disturbance or from any abdominal pain, even of appendiceal character. Even if it had been possible to interrogate the patient before he became so engrossed with his present distressed condition, some points might have been elicited which would have materially assisted in making a more accurate diagnosis, especially in determining the cause of the peritonitis from which it was very apparent that he was suffering. The sudden escape of gas on opening the abdominal wound is almost significant of perforation from either gastric or duodenal ulcer owing to the rapid fermentative changes that occur in the visceral contents

of this region, rather than to a ruptured appendix or gall-bladder, and under these circumstances it will be always well to seek for the trouble in the upper part of the abdomen rather than waste time in attempting to find a perforation lower down.

It has been advised by medical authorities that some coloring matter, as methylene blue, may be administered by the mouth, and its escape through the perforation into the peritoneal cavity will then facilitate the location of the ulcer after the abdomen has been opened. This may hold good in ulcer of the stomach, where the fluid would naturally pass out quickly without any digestive changes having taken place; although this procedure will hardly lend itself to the practical surgeon any more than the puncture of the abdomen with a hypodermic needle in the hope that gaseous bacteria and cellular evidences of perforation can be aspirated. Unfortunately in this class of patients, before operative procedure has been determined on, the general condition has become so grave that the time spent in prolonged search in the different parts of the abdomen will militate very materially against a favorable result.

The ordinary signs of perforated peritonitis are well known, namely, (*a*) pain, which is often misleading as to its position, (*b*) great muscular rigidity, (*c*) a flat abdomen, and (*d*) at times the disappearance of liver dulness, especially when due to gaseous distention from the escape of the stomach's contents.

Again, the sex may be of some assistance in unravelling the diagnosis, perforating gastric ulcer being more common in women; according to Weir's tables 80 per cent. being thus affected, and in perforated duodenal ulcers the figures are about reversed, showing that men are much more liable to duodenal ulceration than women.

It is hardly necessary to say that the surgical treatment of perforated peritonitis cannot be too prompt. If the diagnosis can be narrowed down to either the stomach, duodenum, or gall-bladder, the incision should be along the edge of the rectus muscle, which may be supplemented by one at a right angle to it, across its upper portion; if more room is demanded, it is of great importance that the operative field should be sufficiently exposed to permit a rapid survey of the supposed site of perforation.

If food or material has escaped, the surgeon's action is ren-

dered more certain, and a rapid, thorough inspection after wiping away any escaping fluid will accurately disclose the region of perforation. If nothing is visible in this region, the examination of the posterior gastric wall can be accomplished by either tearing through the gastrocolic omentum, or by turning up the omentum and large bowel and the lesser omental cavity through the mesentery as in posterior gastro-enterostomy. From the lower end of the wound, which is large enough to admit the hand, the appendiceal region can, if necessary, be easily explored. When the perforation is found it should be closed by a double or triple row of sutures. No attempt should be made to excise the ulcer before suturing, as this takes time; and in the collected cases of operations it is shown that results are not any better where this procedure has been resorted to. The closure of the perforation, however, leaves much of the trouble still unfinished. The proper and systematic cleansing of the peritoneum is then of the utmost importance. If the extravasation is limited, careful wiping out of the affected portion of the peritoneal cavity with gauze will in most cases suffice better than the large, warm irrigations of sterile salt solution, which are more suitable in extensive or general peritonitis. The systematic cleansing of the peritoneal cavity will be of the utmost importance, and too great care cannot be given to this procedure.

If there is any question in the mind of the surgeon as to his ability to close the perforation, a small packing of iodoform gauze may be left in around the sutures and allowed to remain forty-eight hours; but this is rarely necessary if careful and systematic suturing with two or three rows of carefully introduced sutures has been resorted to. It is needless to say that the mortality in this condition is very great, the percentage of recoveries being exceedingly small. In perforating gastric ulcer, according to the paper published by Weir, the mortality was 78 per cent., the patients dying invariably of shock or peritonitis.



## INDEX TO SURGICAL PROGRESS.

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### ABDOMEN.

I. The Surgical Treatment of Acute Hæmorrhagic Pancreatitis. By DR. F. B. LUND (Boston). The author gives details of six recent cases occurring in the practice of himself and of his colleagues in Boston, one of which, operated on by Dr. J. C. Munro, recovered. Five of the cases were in women, one in a man. One case, that of the man, presented itself in a manifestly hopeless state, and died without operation on the third day after admission to hospital. One died on the operating table; one three and a half hours after operation from shock; one on the third day after operation from peritonitis and sepsis; one eight weeks after operation from secondary hæmorrhage. Two of the cases were more properly peripancreatitis. Before operation or autopsy, an absolute diagnosis is generally impossible. The signs are those of an acute peritonitis originating in the epigastrium, which, from whatever cause, demands exploration of the abdomen.

Milder cases of acute pancreatitis or peripancreatitis recover both with and without operative intervention. Severer cases require operation, which should be performed early, for the following reasons: (1) Because the primary hæmorrhage in itself leads to necrosis and disintegration of gland tissue, and the hæmorrhage may be stopped and further necrosis both of fat and gland tissue prevented by gauze packing and adequate drainage. (2) Because the patient is in far better condition to withstand an operation early in the disease than later, when weakened by suppuration in the lesser peritoneal cavity, and necrosis of much fat and gland tissue.

A certain class of cases in which the primary shock is so severe as to render operation out of the question must be excepted from the operative cases.

The mortality from pancreatitis will undoubtedly be high, but there is reason to hope that with early operation and adequate provision for lumbar drainage it may be considerably diminished.

As the diagnosis must, in a large percentage, be tentative, the first or exploratory incision should be made in the median line above the umbilicus. This incision may, in severe cases, be made with advantage under local anæsthesia. On account of the weak condition of most of the patients rapid operating is essential. The great omentum must be traversed to reach the lesser peritoneal cavity. Masses of blood-clot and necrotic fat should be rapidly evacuated. Further hæmorrhages may be stopped by gauze packing. It will be generally impracticable to search for bleeding points.

Where the mass of blood-clots or the abscess cavity has extended into the left lumbar region, adequate drainage must be provided by a lumbar incision made on the finger passed into the cavity. This dependent lumbar drainage is probably the most important step of the operation, since in the majority of cases it will probably not be possible to drain successfully through a median incision. In case symptoms at the base of the left pleural cavity point to pocketing of pus above the spleen, the subphrenic space should be drained by resecting the tenth or eleventh rib in the posterior axillary line. The pleural cavity will be opened, but will be probably walled off by adhesions. At any rate, drainage of this pocket is essential, in order to avoid perforation of the diaphragm by the abscess. Careful diagnosis, rapid operating, and careful nursing will be necessary to save these cases, as the proximity of the inflammatory process to the solar plexus, the diaphragm, heart, lungs, stomach, and duodenum, together with the deep situation of the pancreas, all contribute to make its inflammation so dangerous and difficult as to tax to the utmost the

art and skill of the surgeon.—*Boston Medical and Surgical Journal*, November 29, 1900.

## GENITO-URINARY ORGANS.

I. Operation for Severe Hypospadias. By MR. R. HAMILTON RUSSELL (Melbourne). The author, having to treat a boy, nine years of age, in whom the urethra opened in the perineum, without a vestige of a urethra throughout the penis, while the imperforate glans penis was bound down to the perineum, adopted with success the following operative method:

I. A thread was passed through the glans penis to control the glans and facilitate traction upon it; then the frænum binding down the glans was cut across by an incision which was carried through the skin entirely around the penis, not too close to the corona, the prepuce on the dorsum being thus divided by the circular sweep. The tip of a finger, inserted into the gaping wound in the concavity of the penis, felt for any bands which still bound it down, and these, as felt, were divided with successive cuts with scissors, which were freely used until the penis was quite released and could be drawn out straight. There was then a great length of raw surface exposed between the opening of the urethra in the perineum and the glans, along which the median sulcus between the corpora cavernosa was deepened by further careful dissection and the removal of the remains of the longitudinal fibrous bands already divided.

II. The glans was then perforated by a tenotomy knife thrust through its substance close to the under surface; by incising freely towards the dorsum a capacious channel through the substance of the glans was constructed.

III. Two longitudinal incisions through the skin of the penis were then made, one on each side of the raw surface, running about one-third of an inch, or less, from its margin, starting near to the perineal opening of the urethra, and carried forward, always parallel to the cut margin, over to the dorsum of the penis

till they met (Fig. 1, E, E'). By this incision a strip of prepuce was marked out which surrounded the penis in a manner closely resembling a clergyman's stole. This strip of skin was loosened from its connections everywhere except at its extremities, and the free loop was slipped over the end of the penis; it was then manipulated so that the cutaneous surfaces were apposed and the raw surfaces turned outward. Forceps, passed through the channel in the glans, then seized the loop and pulled it through; the redundant portion of the loop was then cut off, and the two lateral portions of the new urethra were fixed in position by stitches at the meatus.

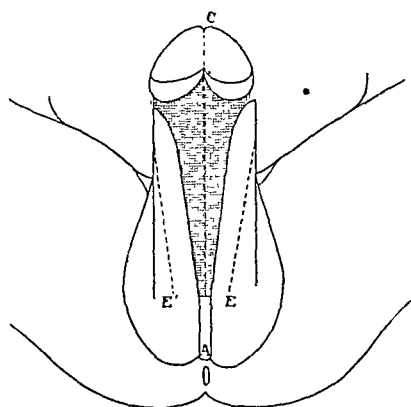


FIG. 1.

IV. The skin-flaps to cover in the raw surfaces behind the corona and along the under surface of the body of the organ were then adjusted and sutured. On the dorsum the procedure was as simple as in circumcision; on the under surface of the body, the presenting edges of the turned-in strip, E, E', which formed the walls of the new urethra, were included in the sutures, each suture thus traversed four cutaneous edges. (Fig. 2.) The sutures did not fully pierce the edges of the new urethral strips, but caught them on the raw surface close to the edge, so that the edges of the urethral strips were somewhat inverted as the sutures were tied. The deeper edges of the new urethral strips

were adjusted in the mesial sulcus between the corpora cavernosa and did not require any suturing. At the spot where the perineal urethra became continuous with the new penile urethra a puckering caused a nipple-like projection of the skin, which was snipped off with scissors. The sutures having been tied, a narrow bandage of iodoform gauze was wound round the organ and left undisturbed for several days. No rod of any kind was placed in the new urethra thus formed.

V. A suprapubic cystotomy was then done, and after the insertion of a drain to carry off the urine, the closure of the perineal opening was proceeded with. The author advises, how-

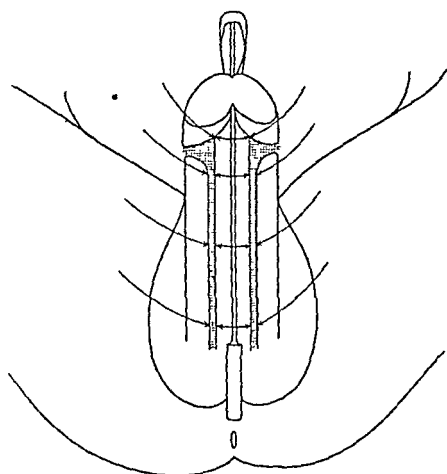


FIG. 2.—Application of the sutures.

ever, that this final step be deferred until after sound healing of the penile wounds has been secured. He thinks that, although success finally crowned his own effort, it would have been more easily and certainly secured if he had made the operation in two stages, separated by an appreciable interval.

The closure of the perineal fistula was the most difficult part of the whole procedure. He found it necessary to define accurately the ridge marking the union of the urethral mucosa with the skin of the perineum; the separation between the two at that point was accomplished by cutting off the crest of this ridge all the way round with a delicate pair of scissors. The edges of the

urethra now fell naturally together when the thighs were approximated, and did not need to be sutured. The skin of the perineum was undercut slightly and approximated by a few sutures. After a fortnight, the suprapubic drain was dispensed with. The ultimate result was highly satisfactory.—*British Medical Journal*, November 17, 1900.

## RECTUM AND ANUS.

**Epithelial-Lined Anal Fistula.** By DR. PAUL MEISEL (Freiburg). Special attention is accorded to this variety of fistula in ano, both because of its etiology and the special treatment required to effect a cure. Two cases are cited. At the operation it became evident that the interior of these fistulæ was lined by a smooth, shining vascular membrane possessing all the properties of mucous membrane, wherefore the entire tract was each time excised. At the visceral orifice of the fistula, in one case, a grape-pit (coprolith ?) was found, and in the other instance an anise seed. Histological study showed this membrane to have all the features of the normal mucous membrane peculiar to the bowel. All cellular infiltration and any other inflammatory products were conspicuously absent, save at the external orifice of the fistula. The existence of a well-defined mucous membrane makes it certain that we have not to consider this as an epidermization, starting either from the skin or the mucous lining of the rectum. As best explaining this state of affairs, the author draws on the findings of Chiari, who described very small diverticula situated at the lower end of the bowel. Recently, this condition was again pointed out by Graser. The latter views them as pressure diverticula occasioned by the weakened rectal wall; because of the congestion of vessels which causes gaps in muscle substance pressure in the bowel causes prolapse of mucous membrane into this space. The necessity of total excision is therefore apparent.—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 2.

MARTIN W. WARE (New York).

## REVIEWS OF BOOKS.

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DAS BERLINER RETTUNGS-WESEN. By PROF. E. VON BERGMANN.  
August Hirschwald, 1900.

This pamphlet treats of the methods in use for the rescue of the injured in the municipality of Berlin. In the main, their perfected system does not differ from that in vogue in other large cities.

The evolution of the Berlin system shows how, in turn, Samaritan organizations, casualty insurance companies, and trades-union benefit associations independent of larger hospitals, sought to provide for the injured. These latter contended that the crowded condition of larger hospitals militated against immediate attention of the proletariat, wherefore convalescence was delayed, and often incomplete at the time of discharge; in addition, the patient was used as a clinical object, and to wit, all of this, the physician was robbed of his fees! This, indeed, was socialism running riot; and it is needless to say that these erratic efforts failed, since each of the aforesaid organizations appealed to but a small circle of the community, leaving the greater number not of the proletariat unprovided. It was very natural, therefore, in the interests of humanity, for the "Berliner Rettungs Gesellschaft" to establish stations throughout the city to render first aid to the injured, and to provide for their transport to some large private or municipal hospital. The "Rescue Society" is now, by mutual agreement, an integral part of all the hospitals in the city of Berlin. The ultimate destination of an injured party is determined by telephonic inquiry at a central station, and his transport is cared for by private ambulances, subsidized or contracted for.

In contrast to this, the American system, apparently unknown to the author, must be regarded simpler in view of the

spontaneity of action, since every district is paroled by a definite hospital known to the public and officials alike. Two defects of the Berlin system are, the delay incident to inquiry at a central station and the leasing of ambulances from private organizations. With us an ambulance is identical with the hospital whence it comes, and thus the transport of a patient to a hospital far removed is obviated. However, the Berlin system has stood the practical test.

MARTIN W. WARE.

TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIATION. Vol. XVIII. Edited by DE FOREST WILLARD, M.D., Ph.D., 1900.

This volume contains the papers read before the Association at Washington, in May, 1900, Robert F. Weir being President.

The President's address was on the subject of perforating duodenal ulcer, wherein he reports one case upon which he had operated, and all the other cases of operation in the literature of surgery, numbering fifty-one. An instructive feature in this address is a grouping of these cases into three sets, as follows: diagnosis wrong, ulcer not found, 26; diagnosis wrong, ulcer found, 12; diagnosis right, ulcer found, 13. Happily, these last thirteen cases are from the more recent reports.

Papers on non-perforating gastric ulcer by Rodman, perforating ulcer of the stomach by Finney, benign obstruction of the pylorus by Klemmer, malignant diseases of the stomach and pylorus by Mayo, the surgical treatment of simple dilatation of the stomach and of gastroptosis by Curtis, the diagnosis of cancer of the stomach by Hemmeter, hour-glass stomach and its surgical treatment by Watson, observations on gastric functions before and after gastro-enterostomy by Fischer, and on adhesions about the stomach by Cabot, constitute, with the discussions upon the same, a treatise upon the surgery of the stomach of vast practical value to the medical profession, and of great credit to American surgery. Nearly all of these papers have been also published in full in the *ANNALS OF SURGERY*.



Besides these are many papers upon timely and important surgical subjects. Particularly interesting is J. Collins Warren's study of peritoneal infection in typhoid fever.

This volume closes with the report of the committee on the medico-legal relations of the X-rays. The report shows careful work in its compilation, and embraces the views of all classes of experts. It teaches that there are many difficulties in the interpretation of X-ray pictures, and that the skiagraph may be responsible for surgical errors and medico-legal injustices.

JAMES P. WARBASSE.

ORTHOPÆDIC SURGERY: A HAND-BOOK. By Charles Bell Keetley, F.R.C.S. London: Smith, Elder & Co., 1900.

This is a business-like volume written in somewhat polemic style. The author is a man of opinions, and does not hesitate to break a lance with an opponent with whom he happens to differ. As his lance bears rather a sharp point, he is likely to have several *combats à l'outrance* on his hands. No doubt he will take hard knocks as cheerfully as he deals them out to others. In many respects the practice of the author differs from that of orthopædic surgeons in this country, and some of the appliances and methods which he praises have on this side of the water, at any rate, been long since abandoned. The author restricts his subject in a manner which will disappoint those who take up the book expecting to find information as to the pathology and treatment of the tuberculosis of joints, a subject always exhaustively dealt with in American text-books on orthopædics, but almost wholly omitted by the author. There are many practical points of value, however, in the book, and the reader will be impressed with the vigorous personality of the author, who writes in a terse and vigorous Anglo-Saxon that cannot fail to be understood. The book is an interesting exposition of the art of orthopædics as practised in the mother land.

ALGERNON THOMAS BRISTOW.

# ON NON-OBSTRUCTIVE, POSTOPERATIVE ANURIA.<sup>1</sup>

By F. TILDEN BROWN, M.D.,

OF NEW YORK,

ADJUNCT ATTENDING SURGEON TO THE PRESBYTERIAN HOSPITAL; SURGEON TO  
TRINITY HOSPITAL.

ALTHOUGH in presenting this topic we have little new to offer, it is broached with the hope of gaining from the discussion a clearer conception of those illy determined renal and systemic states which precede and accompany kidney failure, as well as to see formulated the best means to avert this issue when it threatens. In using the word anuria, it is not sought to exclude consideration of those cases of alarming oliguria which may happily recede before impermeability becomes absolute. Nor is it meant to confine consideration to such sequelæ after any particular operation; although the paper is written from the stand-point of renal surgery, partly, in order to admit any evidence regarding that reflex inhibition which at times is noted after a trauma to some part or single organ of the group; but just how this result could be obtained by mechanical injury, if it were sought, experimental work has not been taught us. Because the following case of fatal nephrectomy with renal suppression presents some salient features, it will be used for the framework of a very brief *résumé* of a subject where one retrospect suggests that surgery makes too little of physiology and medicine. At any rate, the writer's disappointment in this individual case is coupled with the thought of what might have been the result had his knowledge of these subjects been more positive.

Perhaps your verdict may enable us to decide whether

<sup>1</sup> Read before the New York Surgical Society, November 28, 1900.

such experiences are to be classed as unavoidable accidents incidental to surgery, or, on the other hand, as direct results of a careless preparation of the patient, faulty technique during or ill-advised management after the operation; and if, by an interchange of views on methods in dealing with these cases, we can feel that our future patients may be more safely guarded against the risks of nephrectomy, this report of a personal misfortune will have served a purpose.

A. H., an undersized, poorly developed but not flabby youth of nineteen, entered the Presbyterian Hospital in September, 1899, with a left lumbo-abdominal tumor and a temperature of 103° F. When thirteen years old he had a fall, injuring his left side; two years afterwards symptoms of left renal disease appeared. A month before admission another fall added to his trouble, and some pain with vomiting accompanied the appearance of a lump in his side. Under chloroform anæsthesia a large pyonephrotic kidney was opened and drained.<sup>1</sup> No stone was found, and a catheter passed through the ureter showed it unobstructed. In a month he left the hospital with a renal fistula. For five months his health improved; then the sinus began at times to close, and symptoms of absorption, with painful overdistention, returned, which he relieved by inserting a knitting-needle. In May last, 1900, he asked for another operation to obviate his pain and an-

1 Right Kidney, by Ureter Catheter.	Bladder Specimen.	Left Kidney, by Ureter Catheter. <sup>2</sup>
<p>Specific gravity, 1025.  Reaction, acid.  Albumen, none.  Sugar, negative.  Urea, 2.7 per cent.  Blood, none.  Pus, none.  Mucus, small amount.  Casts, none.  Bacteria, no pathogenic varieties found.  Epithelium, few round cells from ureter.  Crystalline and amorphous deposit, considerable uric acid, crystalline deposit.  Other structures, none.</p>	<p>1029.  Acid.  Trace.  Negative.  3 per cent.  Few cells.  Moderate amount.  Small amount.  Few hyaline casts.  No pathogenic varieties found.  Few bladder-cells and groups, presumably from the renal pelvis.  Moderate amount of uric acid.  None.</p>	<p>The little urine so collected, before pus occluded the catheter, showed it to consist chiefly of pus, a few blood-cells, little mucus, and groups of epithelial cells, with a very few hyaline and granular casts; all of which would probably indicate a pyelonephritis of the left kidney. No evidence of tubercle bacilli or other pathogenic organisms, elements of pseudoplasm, or evidences of stone.</p> <p><sup>2</sup> At this time nearly all urine excreted by this kidney found exit by the fistula.</p>

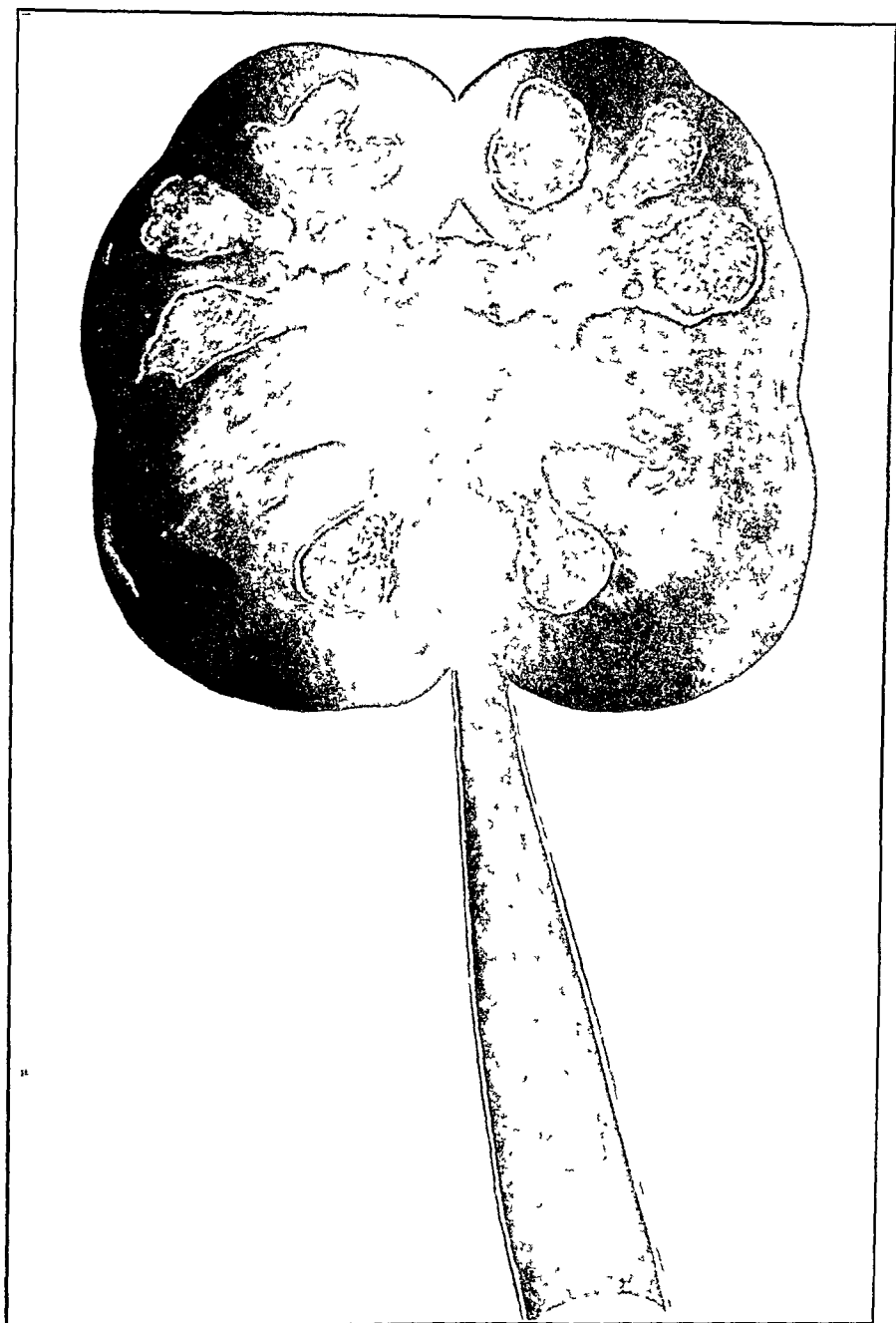


FIG. 1.—Mrs. A. W. Tuberculous right kidney and ureter. Four pyramids with cheesy necrosis. Dilated ureter with tubercles.



noyance of the fistula. His ureters were catheterized; there was again no obstruction in the left, and the right gave issue to normal urine from that kidney. This evidence confirmed the first requirement for nephrectomy, and otherwise he appeared a fairly suitable subject for the operation. He was directed to devote a month to out-door invigoration and given an iron and strychnine tonic.

On July 10, 1900, he again entered the hospital, and was observed for two days prior to operation. He showed an afternoon temperature of  $101^{\circ}$  F. The urine passed from the bladder, nearly all of which was derived from the right kidney, averaged thirty-one ounces in twenty-four hours. Its character was good and similar to that tested one month before. Now, as then, an undetermined amount of faulty left kidney excretion found its way to the bladder, but nearly all traversed the fistula. One night he had an attack of renal distention with severe pain, due to occlusion of the sinus. He was prepared in the usual way for operation by catharsis, etc. Since chloroform was to be used, he had four minims of Magendie's solution subcutaneously an hour before and one-thirtieth grain of strychnine sulphate just before anæsthesia. The lumbo-abdominal surface was well exposed for nephrectomy by a graduated mound of underlying sand-bags.

The operation was somewhat tedious, because the old cicatrix, with its central sinus, made recognition of the aponeurotic layers and peritoneum difficult, and the kidney was a large one, with much of its fatty capsule changed to cicatricial tissue. The ureter was identified at the lower pole of the kidney, doubly tied and cut.

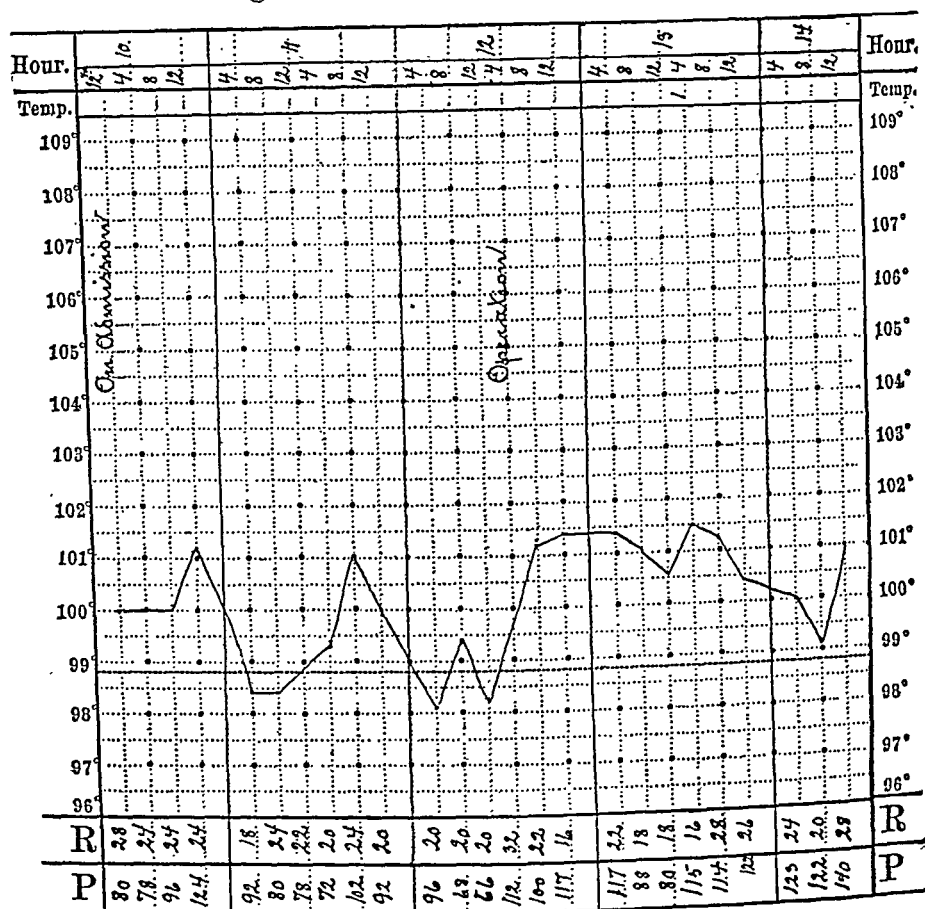
Then the organ was turned upward and forward, giving easy access to ligate the pedicle. Extremely little blood was lost during the operation. The patient had taken the anæsthetic well, and was removed in good condition, having been one hour and a quarter under chloroform anæsthesia.

Pathologist's report showed a large typical pyonephrotic kidney having no tuberculous or calculous formations.

*Pathological Report on Kidney.*—Pelvis and calices extremely dilated. Kidney is seven inches in length; kidney tissue forming walls of cystic mass is for the most part one-eighth to one-sixteenth of an inch thick. Lining membrane is deeply congested, rough, and is covered for the most part by a thin layer of yellowish exudate. No foci found.

*Microscopical Examination.*—Some sections show structures of kidney comparatively unchanged. Tubules a little dilated and cells flattened. Many casts, some congestion, occasionally a little focus of leucocytes. Other sections show almost no kidney structure; occasionally a single tubule in the midst of inflamed tissues resembling granular tissue. In some sections the capsule is much thickened, dense, and infiltrated with leucocytes.

On reaching the ward the patient was given a sedative enema



(trional, sodium-bromide, whiskey, and salt solution). For the twelve hours following operation the temperature remained at 101° F.; pulse averaged 100. He had been having alternating doses of strychnine,  $\frac{1}{30}$ , and nitroglycerin,  $\frac{1}{100}$ , by mouth, every two hours. Four hours after operation he voided three ounces of urine, with marked traces of albumen (15 per cent. volume).

Six hours after operation vomited two ounces of green fluid

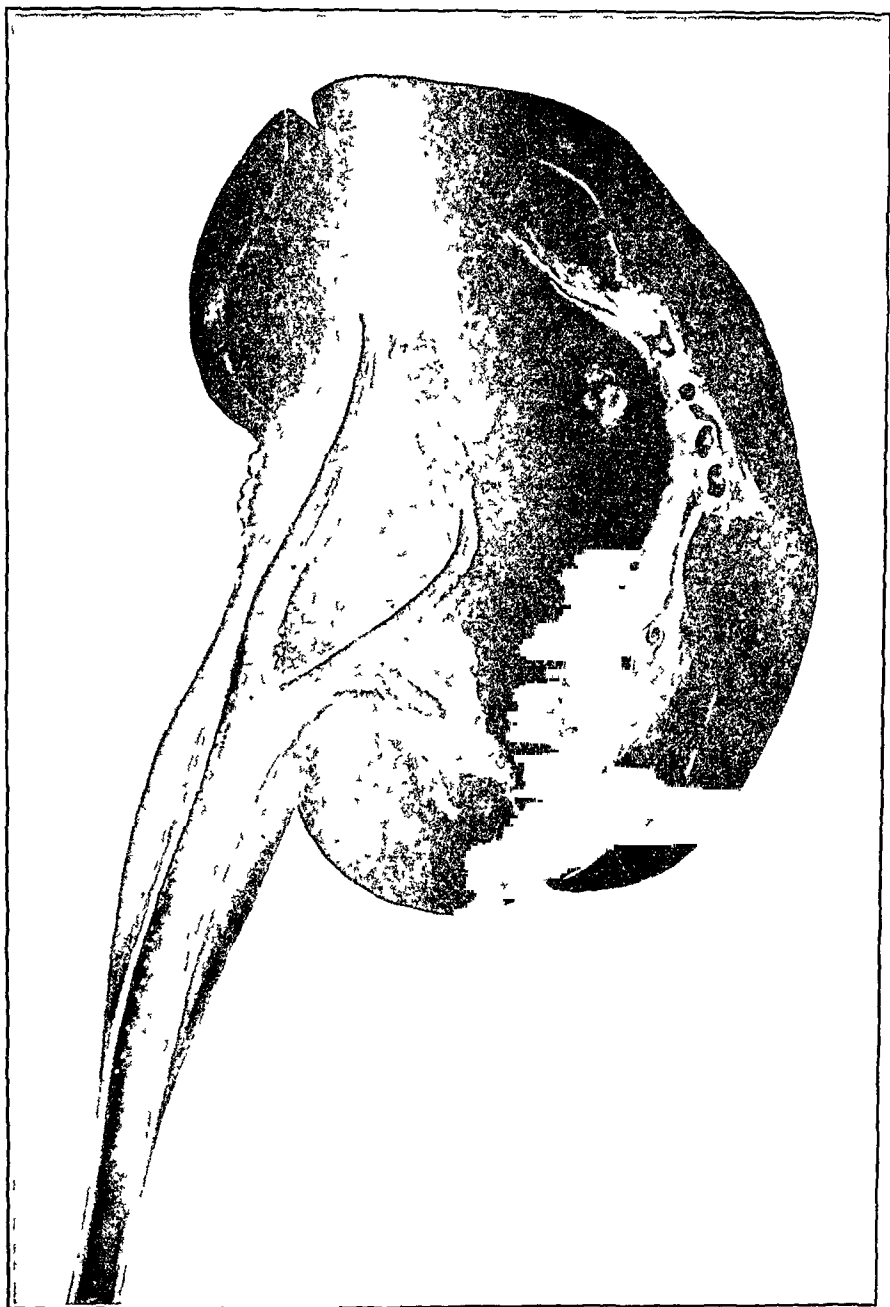


FIG 2—Miss P. A Tuberculous left kidney (single small lesion at apex of a pyramid) Pelvis and upper part of ureter have numerous tubercles and marked peri-ureteric thickening





and passed one more ounce of urine, which was the last during the remaining forty-eight hours of life. Slept four hours during the night.

July 13. This morning he was catheterized; no urine found, and the bladder was irrigated with hot boric solution. Vomiting again. He was given for thirst only egg albumen water by mouth. 12 M. Temperature  $100\frac{1}{2}^{\circ}$  F., pulse 80, respiration 18. All stimulating enemata (salt solution with whiskey) had been retained. Vomiting at intervals in afternoon. Strychnine and nitroglycerin medication was afterwards given subcutaneously. Vomiting occasionally small quantities of green fluid. No abdominal distention or tenderness. Evening temperature  $101^{\circ}$ , pulse 114, poor quality.

July 14. Slept very little last night. At 1 A.M. pulse very weak and rapid. Improved under nitroglycerin. Again bad at 2.30 A.M. Vomiting small quantities quite frequently. 8 A.M. Temperature  $99^{\circ}$  F., pulse 122, of better quality. Stop all medication except strychnine, and substitute intravenous saline infusion (2000 cubic centimetres) for enemata; vomiting continued. 11 A.M. Lavage; four quarts used before fluid returned clear. Two hours later, vomiting. Given two ounces cold dry champagne; this is retained. 3.30 P.M. Pulse hardly perceptible; 1000 cubic centimetres saline infusion. 4 P.M. Cyanosed. 5.30 P.M. Died.

*Autopsy.*—July 15, 1900, eighteen hours after death.

Abnormal conditions, nephrectomy for pyonephrosis; cystitis and pyelitis; parenchymatous nephritis.

Frame, fair size; adipose, scant; muscle, good.

Heart,  $8\frac{1}{4}$  ounces. Pericardium, some petechial spots; valves normal; muscle, very pale, especially the columnar muscles of the left ventricle. Fatty degeneration shown in a specimen teased in normal saline solution.

Left lung,  $13\frac{1}{2}$  ounces, normal; section, normal.

Right lung,  $14\frac{1}{4}$  ounces, normal; section, normal.

Peritoneum, mesenteric glands slightly enlarged; section, normal.

Gall-bladder filled with very dark and thick bile.

Liver, forty ounces. Consistence, normal; surface smooth; parts congested; parts pale.

Spleen, five ounces. Consistence, rather tough; surface, pale; section, pale.

Pancreas, normal.

Kidney, left, absent. Ureter slightly distended in lower portion.

Kidney, right, 6½ ounces. Capsule free. Some congested stars on surface, rather pale. Surface, smooth. Consistence, normal. Section, cortex slightly thickened, of a pale, pinkish yellow. Glomeruli congested. Markings somewhat indistinct. Pyramidal markings somewhat exaggerated. Pelvis slightly distended, contains a little serous fluid. Mucous membrane somewhat congested, and shows a few petechial spots.

Right ureter, lower portion congested.

Stomach contains some dark-brown fluid and a moderate amount of mucus.

Intestines. Cæcum unusually full and movable. Cæcum and lower end of ileum somewhat congested, solitary follicles enlarged.

Bladder a little congested, especially at base. Contains a little turbid fluid. Prostate, seminal vesicles, and urethra normal.

Microscopic examination of sections of

Kidney. Tufts injected with red cells. Capillaries rather congested. Tubes well preserved in most places; some are full of swollen granular cells with unstained nucleus.

Liver. Interstitial inflammation; parts are congested; a few new formations of bile-ducts.

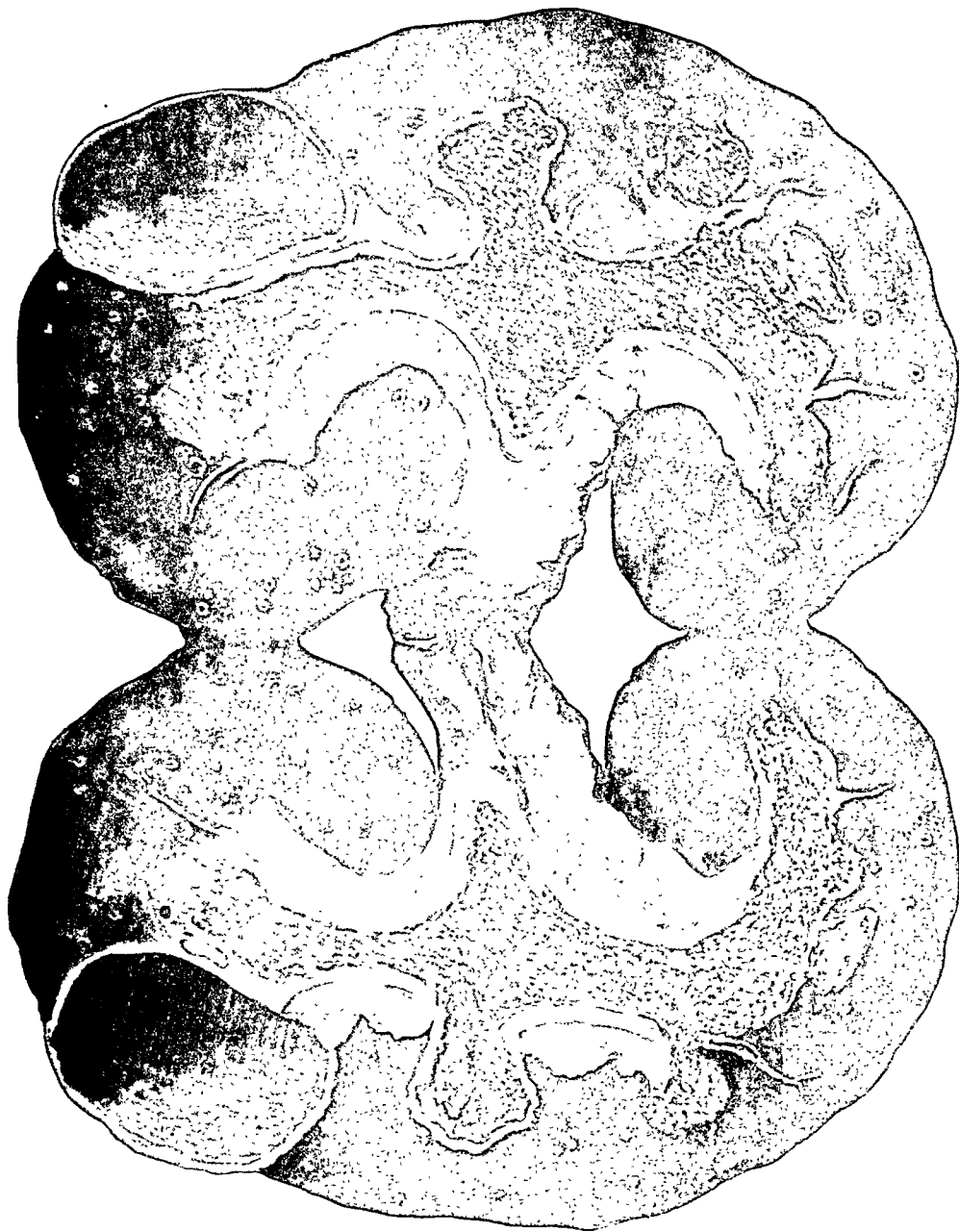
Heart. Celloidin sections show some pallor of fibres; the fat droplets seen in teased specimens are gone.

Before criticising the operation and after-treatment, we shall inquire into the cause of death and the cause of anuria. As already noted, the two chief features before death were a failing heart and renal suppression. The two chief features of the autopsy concerned these same organs. By what processes during or following the operation was the former brought about? Failure of a fatty heart quite surely was the cause of death. What made it fail? Whether general systemic shock resulting from the operation or inhibition due to auto-infection in consequence of renal excretory failure?

The kidney at necropsy and by a later microscopic examination showed congestion, but no nephritis.

The quantity and quality of urine excreted by this organ

FIG. 3.—Mr. I. C. Tuberculous right kidney. Lesions in the pelvis, and a large cyst.





before operation evidenced no congestion. What happened during or after operation to cause it?

We can suspect

(1) Chloroform anæsthesia.

(2) Compression of the kidney and vessels of its pedicle against the spine when the superimposed body rested for a long time on sand-bags, leading to a subsequent hyperæmia.

(3) Some essential vasomotor reflex started by ganglionic pressure or through the renal plexus from removing the fellow kidney, or a congestion incidental to an increased physiological demand.

Subsequent to the operation, we can suspect that a weak heart favored a condition of comparative stasis (passive congestion). If this last is the correct explanation of the congestion, and if the lowered heart pressure at the same time could so quickly bring about suppression, then this anuria had but the remotest, if any, influence in causing death.

Per contra, if any of the former supposed reasons gave rise to the congestion with an accompanying anuria, we could argue that this latter was a potent factor in causing death by the influence of a uræmic state on the heart; but even a complete suppression of so short duration is not apt to manifest any appreciable uræmic condition.<sup>2</sup>

Had the congestion of the kidney anything to do with the anuria, or had they even a common origin? The writer is not in a position to argue it, but in leaving all this uncertain field he would express the general view that his patient with a fatty heart, after traumatism incidental to a nephrectomy, gradually developed a weaker heart, vomiting, anuria, and

<sup>2</sup> Chatin et Guinard: De la Sécrétion interne du rein; exposé théorique et contribution expérimentale. Arch. de Méd. Expér. et l'Anat. Path. Paris, 1900, xii, 137-158. From clinical observations of anuria and uræmia, they concluded that uræmia is not a result of suppression of renal excretion alone, but of interference with the other specific function of the kidney—its *internal* secretion. For we have anuria without uræmia; we have uræmia without strict anuria, *i.e.*, while permeability is still present. Then the experimental work of the authors aims to show that the kidneys produce such an internal secretion.

Bernard: Les fonctions du rein dans les néphrites chronique. Bull. et Méms. Soc. Méd. d. Hôp. de Paris, 1900, 17, 71, and 144. The author dis-

moderate restlessness; in fine, symptoms associated with that lesser degree of shock known as the erethistic type, where a reflex vasomotor paralysis, involving particularly the abdominal vessels, *so lowered the renal pressure* as to both favor a passive congestion there and be the direct cause of anuria. Despite the remedies used, increasing inhibition of nerve activity of all the vital organs led gradually to their functional failure, until with final complete involvement of the heart death ensued.

As to the operation. The indications for nephrectomy appear to have been unquestionable, and the condition of the organ on removal supported the presumption. The propriety of ureter catheterization as a precautionary measure was equally indicated, and, in view of the fatal result, it serves to show that a remaining healthy kidney is not the only requisite to make nephrectomy safe. Important as it is to learn the condition of the other kidney, a sound heart may more than compensate for some slight renal impairment in these operations.

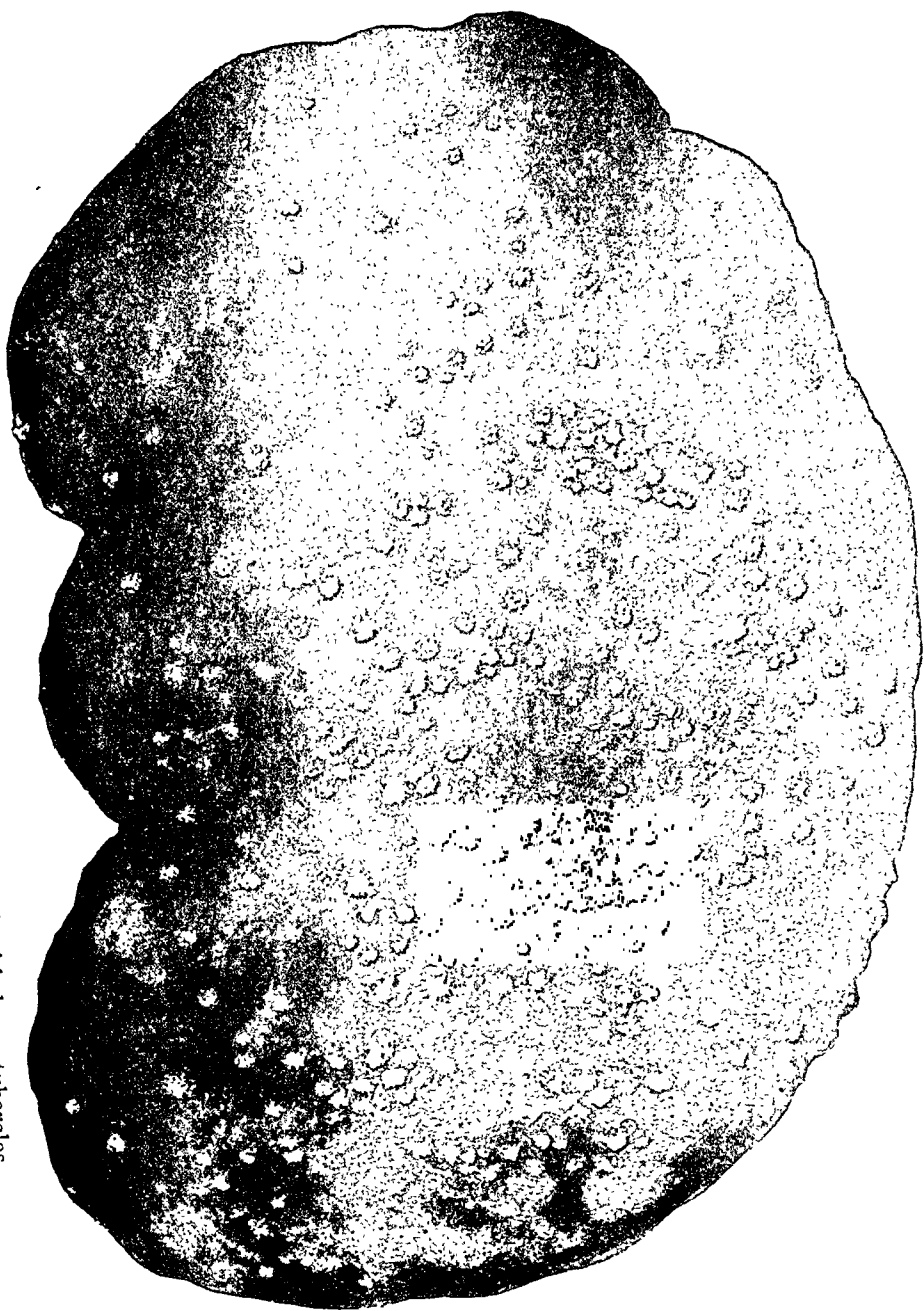
While the method employed for collecting the urine was up to date, the quantity gathered and the technique of its examination were not in keeping with the newest European demands. Still, the report of our patient's right kidney urine examined by Dr. Sondbern both justified the operation from a renal stand-point, and found verification at the autopsy as to its accuracy regarding the state of the organ at the time of catheterization.

Since this was here the case, the present review affords no reason to invoke a discussion on cryoscopy (Korányi), or the phloridzin (Casper) and similar tests for getting at the functional capacity of each kidney.<sup>3</sup>

tinguishes between (1) *Impermeability* of the kidney where excretion of urine is disturbed and (2) *Renal insufficiency* which presents the sum of impermeability plus insufficiency of the other probable function of the renal epithelium. In interstitial nephritis the permeability is at once diminished; while in parenchymatous this function is normal or in early stages even increased. Physiological pathology better than pathological anatomy justifies and explains the distinction between these nephritides.

<sup>3</sup> Von Korányi, A.: Beiträge zur Diagnostik der chirurgischen

FIG. 4.—M. I. C.—Tuberculous right kidney. Cortex studded with large tubercles.







To the preparation of our patient for operation a month was given, because his general tone so clearly needed it, and no immediate urgency was apparent.

In choosing to use chloroform, we were influenced by the fact that the patient had already taken it favorably, and by Kemp's deductions, which, as you well know, show that ether, while producing a rise of general arterial pressure, manifests simultaneously a deleterious and specific influence

Nierenkrankheiten. Monatsb. d. Krankh. d. Harn- u. Sex.-Appar. Berl., 1899, iv. 1-4. The determination of the freezing-point of the blood and urine (cryoscopy) affords a means to determine the diminution of the permeability of the kidneys. Simultaneous examinations of the separate urines and blood give us a method to differentiate the functional capacity of each kidney.

Albarran, Bernard, and Bourquet: Sur la cryoscopie appliquée à l'exploration de la fonction rénale. IV Cong. French Urolog., 1900, 495-504. Authors used this method in patients where one kidney only was affected; the blood serum being normal, they could determine the difference in the freezing-point of the urine from the two kidneys. They examined three cases of pyonephrosis, three cases of tuberculosis, one case of epithelioma, one case of movable kidney, one case of uropyonephrosis, and from these concluded that (1) the diminution of permeability corresponds with the diminution of molecular concentration; (2) that the freezing-point is in some relation to the degree of parenchymatous alteration of the kidney, for in cases where one kidney is affected and the other healthy, the difference in the freezing-point of the two urines is considerable. (3) In determining unilateral kidney affections it is indispensable to associate ureteral catheterization with cryoscopy. (4) This method has advantages over all others: (a) Chemical analysis gives clue only to the elimination of certain bodies, and is influenced by all modification in elimination. The density depends not only upon the quantity of soluble substances, but also upon the weight of the molecules. (b) The toxicity depends upon permeability of various substances, which varies for different ones, while cryoscopy takes cognizance of the ensemble of urinary elimination.

Vaquer: Remarques sur les méthodes proposes à apprécier l'état des fonctions rénales. Bull. et Mém. Soc. Méd. d. Hôps. de Paris, 1900, 17, 133, 138. Discussion: Widal, Achard, in the same. Dissemination of urine and urea very often do not show us the approach of insufficiency of the kidneys. In the present state of our knowledge, by no method (even cryoscopy) are we in a position to ascertain precisely the immediate prognosis regarding renal insufficiency.

Achard: To estimate the permeability of the kidney, chemical analysis of the urine has no value unless it is at the same time associated with chemical analysis of the blood, since it is important to know not only what the kidney excretes, but also what the blood brings to it.

in a lowered renal pressure and almost immediate diminished excretion; whereas chloroform, when producing a decrease in carotid pressure, exerts but an insignificant effect, if any, on the renal pressure or excretion. Although there are some whose views do not coincide with the results of Kemp's extensive laboratory experiments, Gallcazi and Grillo,<sup>4</sup> for instance, maintain that the diminution of renal permeability is more marked when chloroform is used than when ether is administered, and they claim that this result renders any infectious disease with which the patient so anæsthetized may be affected more severe.

While in our case we do not now impute to the chloroform any immediate influence on the kidney itself, resulting in suppression; we do infer that it had an indirect bearing in this result through adding to the pre-existing heart weakness; in other words, that the ensuing shock would have been less with ether anæsthesia.

We view it as a grave error in this particular case that nitrous oxide gas with ether was not employed. All of the indications would have been better met by it. The comparatively small quantity of ether required after narcosis is once induced by gas would here have served a much more valuable purpose as a heart stimulant than it could have done harm as a renal depressant; although, had pure ether alone

Casper and Richter: *Ueber funktionelle Nierendiagnostic*. Berl. kl. Wochs., 1900, No. 29, p. 643; No. 37, p. 643. The authors have sought for the best means by which ureter catheterization can be utilized to determine the capacity for work in each kidney. In cases of unilateral affection, the elimination of urea and the molecular concentration are less in urine of the diseased organ; but in double affections this difference is more or less obliterated. Of greater value is the phloridzin test. When following its administration, the kidneys themselves convert it into glucose, and eliminate it in quantities proportionate to their working integrity. The affected organ emits less sugar. In some unilateral cases where the parenchyma is greatly involved there will be very little or no elimination. In dual affection the amount of sugar is diminished or may be entirely absent. Only in very exceptional cases will the amount of sugar, urea, and the degree of molecular concentration fail to offer parallel evidence.

<sup>4</sup> Gallcazi et Grillo: *L'influence des anesthésiques sur la perméabilité rénale*. La Presse Méd., No. 15, 1900.

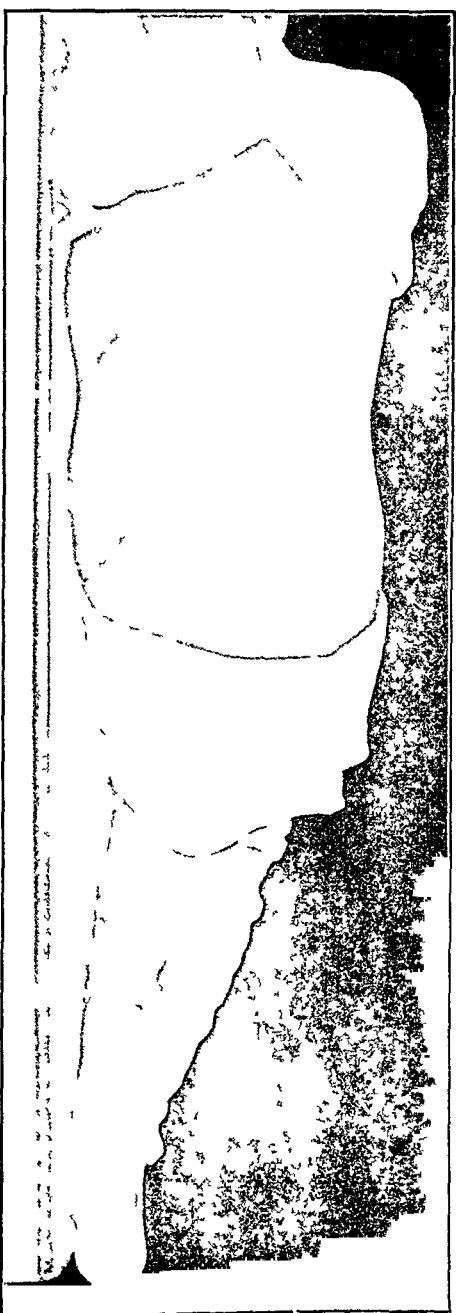


FIG. 5—Postoperative anuria, showing ilio-costal region superimposed on a short wedge of air-bags.



been used throughout our operation, the congested kidney, the suppression and death, might all have been laid at the door of this agent.

In the near future another mixed anæsthetic—nitrous oxide gas and oxygen—appears to have promises of popularity; and since no appreciable influence on the kidneys attends the use of gas, and when given with oxygen by an expert anæsthetist the feasibility and safety of prolonged anæsthesia have been demonstrated. In such cases as those we are considering, where kidney function should receive particular attention, this combination may offer special claims for recognition. The relative value in kidney operations of spinal anæsthesia by cocaine and of ethyl chloride by inhalation remains to be determined.

We have also a word about the prevailing method of posturing patients for nephrectomy. Of course, an expansion of the iliocostal space greatly facilitates the operation. This is ordinarily secured by bags of sand or air underlying the opposite anterolateral region of the abdomen. When by such arrangement the spine is sufficiently flexed to extend the operative field, the pelvis is nearly lifted from the table, and the pyramidal support thus bears a considerable part of the total weight of the body. This pressure impinges upon a yielding surface immediately about the sound kidney; and that the organ may be heavily compressed against the spine with deleterious consequences appears to us quite possible.<sup>5</sup>

Some experiments with bodies so postured over platform scales countersunk on the table showed that 30 per cent. of the body weight was in this way superimposed on the underlying pile.

It seems to us that this could advantageously be avoided by having the lateral pelvic surface and legs repose on an inclined plane, where the weight of the legs would tend to throw the pelvic brim upward, and with it the lower lumbar spine;

<sup>5</sup> Bradford, J. R.: *Journal of Physiology*, 1898-99, p. 415. During experimental partial nephrectomies, he practised intermittent pressure on the renal artery, because it was found that prolonged arrest of circulation was liable to produce secondary changes in the kidney.

while the head and thorax resting on an opposite slope would result in giving the vertebræ a faint upward curvature,—enough, at any rate, to do away with any but the slightest support under the mid-section of the trunk.

This experimental model of a double inclined plane is made in two sections with the idea of permitting an actual gap to underlie that part of the trunk which heretofore has sustained all the lifting strain, and in order to be able to increase or lessen this space according to the dimensions of the patient, as well as arrange the opposing lateral planes at an angle to each other, according as the operation was rather of the lumbar or anterior sort.

While we do not know that renal disturbances can be produced by a constant heavy pressure against the sound kidney during nephrectomy, one case<sup>6</sup> is found reported where a superficial abdominal trauma was followed by suppression. Autopsy showed no thrombi of the renal vessels, and no effusions or lacerations to cause an obstructive anuria; in the absence of any more plausible reason, the condition was ascribed to a ganglionic contusion with a reflex vasomotor paresis.

In answer to some questions, one pathologist, who has done much with the oncometer in studying renal pressure under different conditions, has told us that on examining the kidney shortly after each experiment it was very common to find the organ congested; but whether this was due to pressure of the yielding diaphragm enclosing the kidney or faulty contact with its pedicle by the encircling collar of the oncometer case he did not know.

If we realize that the vascularity of the kidney is such that when in full functional activity an amount of blood equal to the weight of the organ flows through it in a minute's time, and, again, that the secretion of the kidney varies directly with the quantity of blood flowing through it; we may feel that every consideration should be accorded to the single healthy gland during the removal of its mate.

As an instance of renal susceptibility to reflex stimulation

<sup>6</sup>Gayet: Note sur l'anurie de sécrétion post-traumatique. *Gaz. heb.*, 46, No. 23, 1899, p. 265.

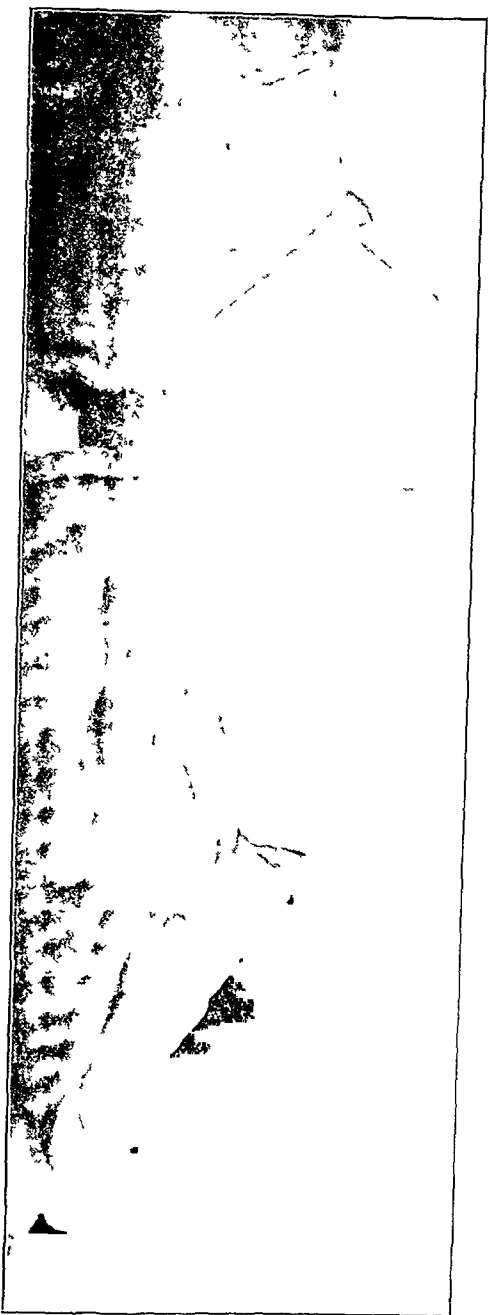


FIG. 6.—Postoperative anuria, showing a long double-inclined plane to flex the spine and minimize pressure upon the costal space.





we have frequently observed a marked polyuria, evoked, apparently, by only a slight insertion of the ureter catheter; and again, but much less commonly, a seemingly unnatural retardation of the flow so marked in one case as to have aroused the suspicion that the ureter was occluded.

While the operator assumes all responsibility for the after treatment, much of it was conducted in common with the House Surgeon. At first we aimed to observe the general principles of moderate systemic stimulation while guarding against any increase of arterial tension, with the inference in mind that a state of more or less congestion for some reason affects the remaining kidney during at least twenty-four hours in all cases of nephrectomy;<sup>1</sup> and that a temporarily diminished excretion with a commonly attending albuminuria and not very infrequent hæmaturia are but the to be expected expressions of such a congestion. We were not perturbed, then, when at the end of four hours our patient passed but three ounces of urine, which in character met all of the above requirements except by the absence of red cells.

Not many hours later we were clearly aware that the renal function was sadly amiss, and, suspecting that we had been too alert in the matter of anticipating high arterial tension, we countermanded the continuance of nitroglycerin. In this particular case we had looked upon the drug with suspicion from the first; and while not ready to maintain that its use was actually injurious, still, in any similar case, we would prefer to intrust the function of the kidney to a strongly acting heart, risking a high tension quality, rather than trust it to a weak one; and for this reason strychnine with digitalis or strophanthus in place of nitroglycerin would under such circumstances be favored.

<sup>1</sup> Tuffier: *Études expérimentale sur la chirurgie du rein*. Paris, 1889. "Each nephrectomy is accompanied by a nearly complete suppression of urine and of urea, lasting for a shorter or a longer time, but not exceeding twenty-four hours, then a return to the normal. . . . The suppression can only be explained by the action reflex upon the single remaining kidney, as this is congested," etc.

Bradford (*loc. cit.*), on the contrary, found a profound change in amount of urine and urea, not limited to a few days. Quantity of fluid often increased, but solids diminished.

Lest you may fail to see the import of our review of this now apparently simple case, we must confess that the conditions of delayed surgical shock were not recognized as such in their gradual appearance. They were viewed rather as manifestations of auto-intoxication due to renal suppression in a person of poor constitution and emotional temperament.

The frequent vomiting, non-assimilation, and the weakening pulse were all thought of in connection with anæsthesia and the threatening anuria. The possibility of a septic state originating in the wound or a localized peritonitis was also conjectured. Even when the restlessness, appearing on the second day, and increasing heart weakness pictured shock, this state was still coupled with the anuria in the sequence of effect and cause rather than the reverse.

In the future, any such patient with a questionable heart would be given a large stimulating enema before, and have it repeated immediately after, operation if there was then the slightest indication.

Anæsthesia would be induced with nitrous oxide gas and continued with ether rather than chloroform.

Exposure of the operation field would be effected with the least possible pressure upon the healthy kidney.

In order to minimize the occurrence of vomiting after operation, and at the same time to better comprehend its cause when more persistent than would naturally follow anæsthesia, all medication would be subcutaneously given or by rectum.

Unless immediately following recovery from the anæsthetic, the third recurrence of vomiting would be met with hot lavage. The first manifestations of anuria would be looked upon, where the pulse was small and rather rapid, as due to a vasomotor paresis; in other words, cardiac weakness with consequently lowered renal pressure the result of shock, and the complex condition would be energetically combated with the most approved methods of stimulation.

# DIAGNOSIS OF STONE IN THE KIDNEY BY THE X-RAY, AND ITS TREATMENT.<sup>1</sup>

By ARTHUR DEAN BEVAN, M.D.,

OF CHICAGO,

SURGEON TO THE PRESBYTERIAN HOSPITAL; ASSOCIATE PROFESSOR OF SURGERY  
IN RUSH MEDICAL COLLEGE (UNIVERSITY OF CHICAGO).

IN 1880 nephrolithotomy was born. Henry Morris, the father of the operation, two years ago, in the Hunterian lectures of 1898, reviewed its development up to that time. He reports ninety-four operations of his own for kidney stone, among these thirty-four nephrolithotomies, with but a single death. It would be fair to say that Morris's lectures of 1898, written as they are by the founder of the operation, by the man who has probably had the widest experience in its application, contain the known facts of value and represent our knowledge of the subject up to the time of their delivery. And yet advances made in this department of surgery within the two years that have elapsed since their publication demand that they be very largely rewritten. The advance to which I shall especially refer is the application of the X-ray as a means of diagnosis in suspected renal calculi.

It is not my intention to attempt to cover the entire subject of renal calculus; I shall limit my remarks to a brief presentation of the diagnosis and surgical treatment of kidney stone. One word first, however, as to etiology. The etiology of renal calculus is not as yet fully understood. The chemical analysis of urinary stones shows that they consist of two parts: an inorganic portion, the salts deposited from the urine, and an organic portion, derived from the mucous membrane of the urinary tract. In primary stones the organic part of the stone is furnished by a mucosa, the subject of a catarrhal inflamma-

<sup>1</sup> Read before the Chicago Surgical Society, November 2, 1900.

tion. In secondary stones, by a mucosa, the subject of a pyogenic inflammation. These facts have been accepted now for a long time. Gallipe, quoted by Harris, and Harris and a number of other observers have found bacteria in the nuclei of stones. From these facts and reasoning from our present knowledge of the etiology of gall-stones, which, as Gilbert and Fournier have shown, can be experimentally produced by injecting pure cultures of typhoid and colon bacilli into the gall-bladder; if we accept the conclusion that gall-stones have as their essential cause a catarrhal inflammation of the mucosa of the bile tracts of mycotic origin, we might accept the same conclusions as to the etiology of primary kidney stones, and say that their essential cause was a catarrhal inflammation of the kidney mucosa of mycotic origin. Although such a conclusion is reasonable, we cannot as yet accept it as a demonstrated fact. In this connection, the possible relationship between the uric-acid infarcts and uric-acid deposits of the new-born and future primary stones must not be overlooked. Harris, in a paper read last year before the Chicago Medical Society, makes an able argument in favor of the bacterial origin of all kidney stones. We can accept his conclusions as very probable, but not conclusively proven.

Our clinical pictures are not always typical, and many other conditions produce a complex of symptoms simulating or suggesting stone. Every operator of much experience in kidney surgery has found that quite a large per cent. of his supposed cases of nephrolithiasis were found on operation to be due to other causes. Morris found no stone and other lesions to account for symptoms in one-third of his cases operated upon. Morris therefore made a correct diagnosis in two-thirds of his cases operated on before 1898, and I believe this would correspond with the experience of most of us. Until recently we have relied upon the symptom complex and the physical examination, and the examination of the urine, for our diagnosis. More recently the separate examinations of the right and left urine, as made possible by the ureteral catheter and the Harris segregator, have been called to our aid, and this has furnished us facts of value in kidney lesions

generally. In, however, but a very limited number of kidney stone cases is this evidence at all conclusive in differential diagnosis. In this same connection might be mentioned the use of the ureteral sound and the waxed ureteral bougie of Kelly. These are to be mentioned, not as practical aids to a diagnosis, but interesting and unique surgical experiences.

The whole subject of diagnosis of renal stones has been revolutionized in the last two years by the X-ray. The successful application of the X-ray to the diagnosis of renal stone furnishes a chapter in the development of renal surgery no less important than the chapters furnished by Gustav Simon and Henry Morris, when they gave nephrectomy and nephrolithotomy to the world.

In 1896, MacIntyre, of Glasgow, obtained a kidney-stone shadow with the X-ray. Operation demonstrated the accuracy of the skiagraph.

In 1897, Swain, of Bristol, England, and Thyne, of Australia, reported cases.

In 1898, L. L. McArthur and the writer reported the fourth and fifth cases of diagnosis of renal calculus with the X-ray, the first made in this country, and preceding any work done by German and French surgeons.

Then rapidly in 1898 and 1899 the cases multiplied, until in January of this year Leonard, of Philadelphia, could collect thirty-six cases in the literature containing his own cases.

In the early development of this work the technique was faulty and crude, and it was regarded as of little practical value. As evidence accumulated, however, surgeons generally admitted that the positive evidence was of value, but the negative was regarded as valueless. The development of a successful technique for the use of the X-ray as a means of diagnosis for kidney stone has been a rapid evolution in which many men have aided, but to no one is as much credit due as to Dr. Charles L. Leonard, of the University of Pennsylvania, who has devised and described a technique which makes both the positive and the negative evidence furnished by the X-ray of the greatest possible value. To quote from Leonard: This

method is founded on the axiom that if rays are employed that will differentiate between shadows of tissues less dense than the least dense calculus, all calculi will be found. To illustrate: The kidney is more dense than the muscles of the loin and abdomen; it is less dense than the least dense calculus. If we take a skiagraph of the loin which shows the outline of the kidney distinctly, if it contains a stone, the stone will show. If no stone shows and still the kidney shadow is distinct, no stone is present.

This suitable penetration and differentiation of the tissues is obtained by using a large volume of Röntgen discharge from a low vacuum tube; exposure five to ten minutes, depending on thickness of the individual.

Leonard believes that he can mathematically demonstrate the correctness of his views, and I agree with him. We must not accept a skiagraph as of value unless it gives the proper differentiation of tissues. It is also quite essential that two or more skiagraphs are made at the same sitting, so that a comparative study can be made. It is also necessary to possess a certain amount of knowledge of skiagraphy in order to interpret correctly the views obtained.

In the *ANNALS OF SURGERY* for February, 1900, Leonard reports fifty-nine cases of suspected renal calculus examined with the X-ray. Of the fifty-nine cases examined, twelve had stone either in the kidney or ureter, eight of these cases were confirmed by operation. One case later passed a ureteral calculus; two others had ureteral calculus, but age of patient did not warrant operation, and one case of positive diagnosis refused operation.

Of the negative cases, seven were operated and the negative diagnosis confirmed in all except one, where faulty technique was responsible for not finding the stone, *i.e.*, the portion of kidney containing stone was not in the field.

I have had the pleasure of seeing Dr. Leonard's skiagraphs, and believe that entire confidence can be placed in his work and conclusions. My own experience agrees perfectly with Leonard's.

I am so fully convinced of the value of the X-ray as a

11' 11" 11" 11"  
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 11' 11" 11" 11" 11"

Left Side



Right Side



HOLNIGEN, 11' 11" 11" 11"  
 FOR MED. 11' 11" 11" 11"  
 11' 11" 11" 11" 11"

FIG. 1.





means of diagnosis in kidney stone that I unhesitatingly say that a perfect skiagraph with the proper amount of detail and differentiation is of greater value as a means of diagnosis than an exploratory operation. Such a skiagraph will show whether there is a stone or not. It will show whether there is one or more stones. It will show which side the stone is on. It will show the position of the stone or stones.

The skiagraph reproduced in Fig. 1, showing a single stone in the kidney, was taken after an exploratory operation had failed to find stone.

If a perfect skiagraph had been obtained before operation, there is no question but that the stone would have been found.

I have had this experience, too, in my last two cases. In one three stones were shown in skiagraph. At the operation but two were found in the pelvis. Needling the kidney substance at the point shown by skiagraph as the location of the third stone, a small stone in the kidney tissue was found and removed. In another case a large and three small stones were shown in skiagraph. The large stone was easily found and removed; the small stones only after very patient search, which certainly would not have been continued had not the skiagraph shown the existence of others besides the large stone.

I have obtained from Mr. Fuchs, in the Schiller Building, a collection of nineteen skiagraphs in which renal calculi are shown; but five of these are my own, and the balance are largely from patients of members of the Chicago Surgical Society. These I present for your inspection. The collection begins with my own case, reported in 1898, and shows a gradual improvement in detail and differentiation, until the most recent cases, skiagraphed within the last three months, which are the clearest and most perfect of the entire series.

I have three skiagraphs taken of the same patient about a year apart, one in 1898, one in 1899, and one in August, 1900. These three pictures show very beautifully two things: First, the gradual increase in size of the stone, and, second, the development of the art of skiagraphy as applied to kidney stone. In the first picture, of 1898, a rather vague shadow, about half an inch in diameter, marks the position of the stone. The 1899

picture shows a stone shadow more clearly, about an inch in length and half an inch in width. The last picture (1900) shows clearly the outline of the kidney, and very distinctly and clearly cut the outline of a stone one and three-quarters inches in length and half an inch in width. No one could deny the value of such evidence as found in this picture. It is not the opinion of an enthusiast, but a fact scientifically demonstrated, that the X-ray exploration of a kidney for kidney stone is of more value than an exploratory operation.

I shall not present a detailed report of my own work, which has been limited to seven nephrolithotomies and two cases in which stones were removed from kidneys converted into pus sacs, but rather I will discuss a few points gained from this experience. First, I have been agreeably surprised in having no mortality; and I am inclined to believe that the mortality from nephrolithotomy is not, and will not be, nearly as great as we have been led to believe from a study of statistics.

Second, the prognosis as to permanent cure is not as good as after operation for bladder-stone or gall-stone. In my limited number of cases I have seen two cases of recurrence of stone after apparently complete operations, one done by myself, and one operated by a competent surgeon. In this last case, two years after the first operation, I operated and removed three stones, which were certainly not present at the time of the first operation. And, again, in some cases where no new stones are formed, the pyelitis persists, and the patient is not restored to complete health because of an impaired kidney or kidneys. On the other hand, in many cases the operation is followed by complete and permanent cure. Finally, I desire to discuss a few points in the technique of the operation. I am done with incomplete operations and operations done in the dark for kidney stone. Such operations may still be necessary in complicated cases, but in the nephrolithotomy done on a kidney not the subject of pus infection a complete operation done under the guidance of the eye is, as a rule, possible, and should be carried out. The entire kidney should be exposed and brought into view, or, at least, under the control of the hand and fingers.

The best incision is an oblique one, beginning a finger's

Left Side.

Right Side.

ROENTGEN X RAY LABORATORY,

FOR MEDICAL DIAGNOSTIC

W. G. FUSCO, M.D.

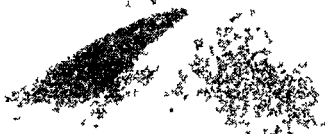
Tel. GENE 7-1111, 405 BROADWAY

FIG. 2.

Right Side



Left Side



Dude \_\_\_\_\_  
Case \_\_\_\_\_  
Doctor A. D. Berman  
100 Lexington St.

ROENTGEN X RAY LABORATORY,  
FOR MEDICAL DIAGNOSIS.

W. C. Fuchs, Manager,  
Tel. Central 1155. 406 Schiller Bldg., Chicago.

Fig. 3.

breadth below the last rib, and running obliquely downward and outward to a point a finger's breadth above the anterior superior spine. This incision has this advantage, that in case of necessity of exposing the ureter, the incision can be extended by a splitting of the external oblique downward to a point above the internal ring, which will give the fullest exposure of that structure. Through this incision the kidney is freely loosened from its bed, so that it remains attached only by its vessels and ureter. In the ordinary patient this will permit the surgeon to bring the kidney out of the wound and in perfect view. In very thick patients, it may not be possible to do this, but we can at least, by introducing the hand in the incision, control the pelvis and the vessels. This control, especially when the kidney can be brought out of the wound, makes the subsequent steps in the operation under as complete control and as easy as in an anterior gastro-enterostomy.

I have now in a number of cadavers experimented with this incision, with the dislocation of the kidney to a position outside of the incision, and have demonstrated that no injury is done to the vessels even when the arteries are injected with plaster and the veins distended with preservative fluid. It goes without saying that old perinephritic processes resulting in much connective tissue and adhesions might make the dislocation difficult, dangerous, or even impossible. The most serious fault in my own early work, and probably many others have had the same experience, has been that I have attempted to do a nephrolithotomy through too small an incision, and with too little exposure of the kidney. These faults have resulted in alarming hæmorrhage, incomplete operation, leaving stones and stone fragments, and difficulty in closing the kidney wound. Do not be afraid of a large incision, as the dangers of hernia are almost *nil*. Do not be afraid of dislocating the kidney; with care and patience it can almost always be safely done. The kidney, its pelvis and vessels under perfect control, is split by an incision two or three inches in length on its convex border, the pelvis opened and examined, and the stone or stones removed; the pelvis washed out with hot normal salt solution and carefully re-examined for stone and stone

fragments. If none are now found, the kidney wound is closed with medium-sized catgut, placed deeply in its substance; the external wound closed with buried catgut and silkworm gut, except a small portion, through which a drain is carried to the closed wound in the kidney substance. Of course, where pus infection exists, the kidney pelvis should be drained.

One word in regard to incising the kidney pelvis, and it is this: With our present reliable means of diagnosis furnished by the X-ray, where a single stone is found and at the time of operation it can be palpated in the pelvis and can be removed through a small incision in that structure, this can be done and the resulting wound in the pelvis closed by Lembert sutures. Personally, I have not done this, but Morris reports a number of cases, and believes that such a procedure does not bring with it any more danger of urinary fistula than incising the kidney substance.

Another point in regard to the pelvis, and it is this: Precaution should be taken to prevent losing small stones by pushing them into the pelvis and dilated ureter during the operation. With a dislocated kidney we can readily guard against such an accident. With the kidney not dislocated, pressure should be made with the fingers to collapse the pelvis, and prevent a stone slipping into the pelvis and ureter during the efforts at removal.

The reliable diagnosis furnished by the improvement in X-ray technique, the complete operation with the kidney under control, has placed nephrolithotomy in a position where it rivals in accuracy of diagnosis and safety of procedure the old lateral lithotomy, the brilliant operation of our student days, the mortality in each being about 3 per cent. in the hands of the expert.

NOTE.—The three skiagraphs reproduced are but fair reproductions of the original plates. It is very difficult to reproduce accurately the view seen in a skiagraphic plate. The plates are much more distinct than the prints. The smallest stone shown in any of my plates was found on removal to be the size of a split pea. The skiagraph magnifies the size of a stone from 30 to 50 per cent.—A. D. B.

# HERNIA OF THE FALLOPIAN TUBE WITHOUT HERNIA OF THE OVARY.

By PAUL F. MORF, M.D.,

OF CHICAGO,

INSTRUCTOR IN SURGERY AT THE NORTHWESTERN UNIVERSITY MEDICAL  
SCHOOL.

It has often been said that whenever the general abdominal cavity is opened, the operator should be prepared for unexpected pathologic conditions. The same may be said in a more limited sense with regard to opening a hernial sac, especially in the female. While in the majority of instances it is possible to arrive at correct conclusions as to what may be expected when the sac is opened, we must be prepared for unusual findings, even after taking into consideration some of the more remote possibilities previous to operating. These statements are illustrated by the following case:

C. H., aged twenty-four years, single, occupation housework, was admitted to the Cook County Hospital, Chicago, September 9, 1898. The patient states that since birth she has had a hernial tumor, about as large as a walnut, located in the left inguinal region, which never gave her any discomfort, and could always be reduced into the abdominal cavity without difficulty. About ten days before admission, the hernia began to increase in size and the contents could no longer be reduced. About the same time she noticed the appearance of a mucopurulent vaginal discharge, which is still present. There has been no vomiting, the bowels move regularly, and the tumor is not especially painful. The patient has always been healthy. She has had no miscarriages, but gave birth to one child at term, four years ago. Her general condition is good, and she presents neither the signs nor



symptoms which might be expected had the gut become strangulated. The temperature is normal, the pulse full, strong, and regular—seventy-six to the minute.

In the left inguinal region is a mass about the size and shape of a hen's egg which extends downward into the left labium majus. This mass is somewhat firm and resistant, but on careful palpation deep fluctuation can be detected. The surface of the tumor is smooth, the overlying skin normal and not adherent, and there is no marked tenderness on manipulation. No impulse on coughing can be felt, nor can the mass be returned into the abdominal cavity. Examination of the genitalia reveals a moderately profuse vaginal discharge; otherwise the organs are apparently normal.

A provisional diagnosis of irreducible inguinal hernia was made. What the contents of the sac would prove to be was a matter *sub judice*. A hernia of the left ovary was suspected, and, from the fact that the condition had existed for many years previous to this complication, it did not appear improbable that the ovary, if present in the sac, might have become enlarged.

Operation next morning, performed by myself, assisted by Drs. Burson and Bench. After the usual preparations, an incision was made over the left inguinal canal through the skin and subcutaneous tissue, exposing the anterior wall of the canal. This was split in the direction of the fibres, and the sac thus exposed was found distended by a mass of tissue, to which it was closely adherent by its inner surface. The mass was continuous above with a cylindrical pedicle about 2.5 centimetres in diameter and four to five centimetres in length, which could be followed into the abdominal cavity through the internal inguinal ring. Here this pedicle divided into three parts. The left division could be traced to the left wall of the pelvis as a firm round cord, and proved to be the left infundibulopelvic ligament. The right division was traced to the left cornu of the uterus, with which it was continuous, showing it to be formed by the left Fallopian tube. The middle of the three divisions was composed of the tissues of the great omentum. Between the right and left divisions of the pedicle, behind the omentum, the ovary was found lying entirely within the abdominal cavity. It was somewhat enlarged and contained numerous small cysts. No intestines or other abdominal organs were found in the sac.

A small incision made into the sac allowed a little thick, greenish, mucopurulent fluid to escape, some of which came in contact with the wound. This incision was immediately closed with a fine silk suture and the field of operation disinfected. It was now thought that we had to deal with a pyosalpinx in the hernial sac, which it was decided to remove. Accordingly, the omentum was tied off with several catgut ligatures and cut. Following this, the pelvic portion of the pedicle was tied and cut close to the pelvic wall. Next, a ligature was thrown around the tube at its junction with the uterus and cut. Finally, the tissue of the broad ligament between the two latter stumps was tied off with several catgut ligatures and then cut, thus removing the sac and its contents together with the left ovary. Finally, the peritoneal cavity was closed and the internal and external oblique muscles sutured to Poupart's ligament, obliterating the internal and external rings and also the canal. Closure of the external wound with interrupted silkworm-gut sutures.

The third day after the operation, the patient developed a temperature of 100° F., accompanied by induration of the tissues about the wound. During the next few days a moderate amount of thin, blood-stained, seropurulent fluid escaped from the wound, after which the temperature fell to normal and the induration disappeared, the patient recovering completely.

The sac and contents were hardened in formalin solution and examined. Instead of finding a pyosalpinx, the mass was found to consist principally of omentum, which filled the sac more or less completely. Into the mass of omentum the tube could be traced, its fimbriated extremity being completely surrounded by omental tissue; from it the infundibulopelvic ligament could be traced, passing out of the sac. It was apparent that the fimbriated extremity of the tube, together with the three or four centimetres of the tube immediately internal to the same, had been lying outside the internal abdominal ring. The wall of the tube was not thickened sufficiently to lead one to think there had been a chronic salpingitis. The fimbriated extremity of the tube lay in a collection of muco-pus, identical in character with that which had escaped during the operation, and from which infection of the wound had undoubtedly occurred. There were between eight and ten cubic centimetres of pus still

present, and the collection was completely surrounded by the herniated omentum. Part of the omental fat had undergone serous change, there being small, thin-walled spaces containing mucoid material; others, however, containing some of the just described muco-pus.

The only satisfactory explanation of the unusual findings in this case appears to be this: The woman had a congenital hernia of the left oviduct complicated by an epiplocele, the fat of which underwent serous change. Shortly before the hernia became irreducible, the patient acquired an acute vaginitis, the infection extending upward along the genital tract into the hernial sac. The invading micro-organisms finding a favorable culture medium in the mucoid substance of the omentum, multiplied, exudation and pus formation occurred, and as a result the hernial tumor increased in size and became irreducible. While, perhaps, this explanation may be open to some objections, it at least appears plausible, and, if faulty, detracts in no way from the fact that the case must be considered unique from both a clinical and pathological point of view.

Hernia of the Fallopian tube, unaccompanied by the ovary, is of somewhat rare occurrence. Boursier<sup>1</sup> discusses hernia of the tube and ovary together, making this statement: "We consider these organs together, for ordinarily the herniated ovary is accompanied by its tube. Cruveilhier encountered no more than two cases in which the tube alone made up the hernial tumor."

The majority of text-books on surgery and gynæcology are silent on this subject. In his classic work on hernia, Cooper fails to mention the occurrence of this condition. Macready briefly considers the subject, and gives several references to cases reported in the literature.

A study of hernias of the tube, unaccompanied by the ovary, seems desirable, for when the two organs together occupy the hernial sac, the clinical signs and symptoms are influenced to a great extent by the presence of the ovary. A

<sup>1</sup> See bibliography at the end of the article.

perusal of the reported cases will show that the study is also of value from the point of view of diagnosis, for in not one of the twenty-three was a correct diagnosis made, nor was the presence of the tube suspected in the majority.

The first recorded undoubted case of hernia of the tube alone was described by Voigt in 1809. The subject, however, attracted little attention until 1893, although several additional observations were recorded in the interval. In this year, Lejars, of Paris, reported a personal observation, and collected eight additional cases (including that of Voigt) from the literature. In a few text-books published since that time, the subject is briefly treated, the conclusions being based mainly on the nine cases described in detail in Lejars's paper. (See Veit's "Handbuch der Gynäkologie," and "Traité de Chirurgie," Le Dentu and Delbet, article, "Hernies des Organes Génitaux," by Jaboulay.)

After 1893, additional cases were described, so that in 1898 Schultz was able to collect in all twenty-one observations. Two of these (Case I of Schultz, mentioned by Puech, and Schultz's Case XVII, reported by Malherbe) I have rejected, since the evidence seems to be insufficient to prove that the tube was the herniated organ. By a careful search I have been able to find four additional cases, although three of them were published prior to 1898. These, together with the one observed by myself, and the nineteen in Schultz's thesis, make a total of twenty-four observations of undoubted cases of hernia of the tube, without the corresponding ovary.

There are several reasons why hernias of the tube without the ovary are rare.

(1) When the tube is found in a hernial sac, it is usually there because it has followed a hernia of the ovary.

(2) The tube is so deeply placed in the pelvis, that exceptional circumstances are necessary to force it into the hernial openings (*vide infra*). Its relation to femoral and inguinal openings is such that, under ordinary conditions, increased intra-abdominal pressure—such an important factor in hernias

of other organs—tends to force it more deeply into the pelvis rather than towards these openings.

(3) When hernia of the tube has developed, the ovary, from its intimate relation to the tube, is also soon drawn into the sac. This seems probable from the fact that in a number of the appended cases the ovary was found close to, or just at, the hernial opening through which the tube had already passed.

*Etiology and Pathogenesis.*—In studying the causes which lead to the production of hernias of the oviduct, it is essential to note the varieties which have been found, and the ages of the patients at the time when their hernias developed. Among the twenty-four cases, the distribution is as follows: Inguinal, 13; crural, 10; obturator, 1.

Of the thirteen inguinal hernias, five (Cases III, VII, XVII, XXI, and XXII) occurred in infants whose ages, at the time when the defect was discovered, ranged from nineteen days to thirteen months. In my case, there was a distinct history of the rupture having been present since birth. It is therefore clear that in nearly one-half the cases of inguinal hernia the fault was congenital, or developed during the first few months of post-natal life. It is not difficult to understand that the tube can enter the inguinal canal more readily at this time than later. The canal of Nuck, "which in the young subject projects as a tubular process for some distance into the inguinal canal" (Quain), is still patent, or not yet completely obliterated, while the tube at the same time still approximates its convoluted foetal arrangement, and, together with the uterus, occupies a relatively high position in the abdominopelvic cavity. In consequence, it is nearer the internal inguinal ring, and can more readily pass through this structure than in later life, when the uterus and its adnexæ are, under ordinary circumstances, deeply situated in the pelvis. However, when pregnancy occurs, the position of the internal genital organs is changed, the uterus and tubes ascend above the pelvic brim, and in this way more favorable conditions for hernia of the oviduct are again developed. It will be noted that in Case VI the patient was pregnant between four and five months when the hernia made

its appearance, and in Case XIV the hernia was first noticed three weeks after pregnancy had terminated. Naturally, intra-abdominal pressure is not unimportant as an exciting factor in these cases. In Guinard's case the patient was working as a "farm assistant" when the tumor was first seen.

Another important etiologic factor is a pathologic condition of the internal genital organs. In Lejars's case a fibroid tumor of the uterus was present, which this author thinks may have tipped the uterus forward, and thus dragged with it the fimbriated extremity of the tube and placed it on a level with the internal inguinal opening.

Finally, the *rôle* played by sudden anomalous movements must be remembered. In the case described by Voigt, the tumor appeared after the patient had taken a long step, the body being forcibly inclined towards the right inguinal region.

The relations between cause and effect are not quite as clear when we come to consider the pathogenesis of the crural hernias; nevertheless, certain etiologic factors can be established. Noting first the ages at which the hernias appeared, they may be separated into decades as follows:

Appearing during third decade, 1; appearing during fourth decade, 3; appearing during fifth decade, 6.

One case was found at the age of seventy years, date of appearance not being stated.

The occurrence of femoral hernias of the tube, hence, does not differ from the occurrence of hernias of other organs in this location, for "in the child-bearing period, sixteen to fifty, the femoral hernias are nearly equal to the inguinal, and after fifty the femoral are slightly in excess." (Macready.) Pregnancy is, no doubt, of some importance in causing a stretching of the hernial openings and an attenuation of the abdominal walls. Child-bearing may also cause a relaxation of the ligaments of the uterus and tubes, and this, together with the absorption of fat and attenuation of the cellular tissue of the small pelvis which sometimes occur in later years, allows an undue mobility of the tube, and so favors development of crural hernia. Unfortunately, some of the observations are

incomplete with regard to the history of pregnancy. In four cases in which the occurrence of pregnancy is mentioned, the conditions were as follows: Multipara (Case IX); II-para (Case X); I-para (Case XIX). In Maydl's case, pregnancy is only alluded to in the statement that the hernia appeared a short time after labor.

One reason for the more frequent development of femoral hernia of the tube in adult life is pointed out by Kousmine. Kousmine measured the distance which separated the tube from the hernial openings and came to the following conclusions: "The internal inguinal ring is situated 1.4 centimetres from the middle of the oviduct and three centimetres from its peripheral extremity. The portion placed nearest the internal ring of the *femoral* canal is the abdominal end of the tube which is within 2.5 centimetres. The middle of the oviduct is 1.3 centimetres from the crural ring. Therefore, the most movable of the genital organs, that is to say, the median portion and abdominal extremity of the tube, are most predisposed to pass through the crural ring, provided there are not other congenital conditions present which determine the entrance of the hernia into a preformed canal in the inguinal region."

Pathologic conditions also play a part here as in the occurrence of inguinal hernia. In Case XVI, a large fibroid tumor of the uterus was present, which may have acted in a manner analogous to that suggested by Lejars in the case of inguinal hernia mentioned above.

Traumatism and severe muscular efforts are also of importance. In an observation of Kousmine, the woman received brutal massage of the abdomen at the hands of a peasant woman, shortly before the hernia was noticed. In Case X, the hernia made its appearance while the patient was doing heavy work in the field, and in Case XVIII the hernia developed immediately after "lifting a box."

*Morbid Anatomy.*—Among the accidents to which the herniated tube is liable, strangulation, which occurred in fourteen of the twenty-four cases, is of prime importance. Of these fourteen strangulated hernias, six were inguinal, seven femoral,

and one obturator. While it may at first glance seem remarkable that the proportion of strangulated inguinal hernias is so large, it must not be forgotten that the inguinal rings in the female are comparatively small structures.

Maydl's case of strangulation is of unusual interest. "The strangulated portion of the tube consisted of a loop which had passed back into the abdominal cavity, after having first passed out through the crural ring (the strangulated part), thus lying internal to the ring instead of external." This Maydl calls retrograde incarceration, and was observed by him, also, in a case of herniated vermiform appendix. It demonstrates one way in which such a slender body as the tube may become strangulated in the crural ring.

As might naturally be expected, strangulation of the tube, if unrelieved, is not nearly as dangerous a complication as strangulation of the intestine. In Case I, treated expectantly, abscess formation followed unrelieved strangulation of the tube. The abscess was allowed to open spontaneously, the gangrenous tube being found in the dressings soon after the pus had been evacuated, the case eventually terminating with recovery of the patient.

Inflammatory changes in the tube, irrespective of those due to strangulation, are not uncommon. In Case XIII, the central orifice of the pavilion was dilated, and the least pressure was sufficient to cause the escape of large drops of muco-pus. In Case XIV, the tube had the volume of a large sausage, and showed changes due to a parenchymatous salpingitis; on section, three abscesses were found separated from one another. In Case XIX, a pyosalpinx was found, the specimen showing the anatomic peculiarities of a tube which had been cystic for a long time, and in which pus formation had occurred secondarily.

Evidences of chronic inflammation of the tube are also not wanting. In one case the tube had contracted adhesions with the neck of the sac, and in another the adhesions united the tube with the sac itself. Cystic dilatation of the tube was noted in three instances, a condition probably resulting from



long-continued irritation and inflammation. Of interest in this connection is a case described by Walther, who found, as the sole contents of an inguinal hernia, what he calls a hydroparosalpinx, the cyst having developed from an accessory Fallopian tube.

Finally, the occurrence of pregnancy in the herniated tube is of importance. There is only one case on record in which the condition was found with certainty, namely, that of Jordan. Schultz, in his thesis, includes two additional cases in which ectopic pregnancy in a herniated tube had probably existed. He admits, however, that these two observations are somewhat doubtful, and to me the evidence seems insufficient to establish pregnancy in the herniated tube with certainty. Pregnancy in the herniated tube was also observed by Genth, but in this case the ovary accompanied the tube, wherefore it has not been included with my cases. In the instance in which the evidence of pregnancy in the herniated tube is satisfactory, gestation had advanced to about the eleventh or twelfth week, when symptoms of strangulation developed. Operation showed the hernial sac filled with clots, and also the presence of a foetus seven and one-half centimetres long. The case terminated fatally.

While the tube had undergone alterations in the majority of cases, it was found normal in three instances. These, however, were all found in infants, and should the condition have existed until active sexual life had been attained, pathologic changes of some kind would probably have supervened.

*Symptomatology and Diagnosis.*—In a study of the clinical aspect of these cases, they may be separated into three groups:

(1) Those in which the post-mortem record only, and no clinical history, is given.

(2) Cases in which no disturbances were caused except those which might result from the presence of any small reducible hernia. To this group belong two cases, both of the inguinal variety and found in infants of fourteen and nineteen months respectively.

(3) Those cases in which the hernias gave rise to important clinical manifestations:

(a) Before the occurrence of complications.

(b) After the occurrence of complications.

This last group is of especial interest.

(a) *Before the Occurrence of Complications.*—In Voigt's observation, the patient complained of irregular abdominal pains caused by the hernia. In another instance, the hernia increased in size during muscular effort, and at the same time cramp-like pains occurred, radiating towards the epigastrium. In a third case, the hernia was painful during the menstrual period. It would appear that this is an uncommon symptom, as dysmenorrhœa is not noted in any of the other observations, and in this instance may have been due to other causes.

Repeated attacks of irreducibility or strangulation may occur, and the patient be comparatively comfortable during the intervals. This was noted in Cases XI, XII, and XIX.

(b) *Symptoms due to Complications.*—These latter have already been enumerated. The complication of greatest importance is strangulation of the tube. While in some cases the resulting clinical picture was modified by the simultaneous strangulation of an accompanying knuckle of intestine, nevertheless, strangulation of the tube is sufficient to produce symptoms resembling those of ileus. In Voigt's case, absence of stools and vomiting are noted. In Case III, the patient's abdomen was tumefied and tender, and there was vomiting of greenish matter. One of Brunner's patients complained of loss of appetite, insomnia, and irregular stools, while in his second case, continued nausea, but regular stools, are noted. It is thus evident that the clinical picture was not a typical ileus in any of these cases, but resembled more nearly the syndrome of symptoms resulting from strangulation of an epiplocele or from a localized peritonitis.

The other complications, namely, pregnancy in the herniated tube, cystic dilatation, salpingitis, and pyosalpinx, did not occur in a sufficiently large number of cases to draw accurate deductions therefrom. It would appear, however, that in these

cases the symptoms resemble those which manifest themselves when these conditions are present under ordinary circumstances, with this exception, that the pathologic process is located in the hernial sac, and the symptoms caused are consequently associated with the clinical signs of hernia.

It is evident that a diagnosis cannot be made on the evidence furnished by the clinical symptoms, because these are not sufficiently characteristic. In fact, a correct diagnosis had not been established in any one of the twenty-four cases previous to autopsy or operation. The most nearly correct was the diagnosis of Guinard and Dufefoy, who suspected a hernia of the tube and ovary, and on operating found, indeed, a herniated tube, but one which had become changed to a pyosalpinx, and no ovary whatever in the sac. In other cases, hernia of the omentum, hydrocele of the hernial sac, etc., were diagnosed, or no definite diagnosis made. It seems, however, that a correct diagnosis might perhaps be made in some cases, if the occurrence of hernia of the tube were borne in mind. A careful vaginal and bimanual examination of the genitals might give evidence which would indicate the true condition. Such findings as the following, which were noted in some of the examinations, would be of diagnostic value. A deviation of the uterus towards the side of the hernia (as noted in the case of Kousmine), the uterus being drawn over and inclined towards the side on which the hernia was situated, or, as in Case XIX, the uterus was in a position of marked anteflexion and seemingly fixed. In Wiart's case, the right uterine cornu faced anteriorly and to the right, being directed towards the abdominal orifice of the inguinal canal. Careful palpation of the contents of the hernial tumor might put the surgeon on the right track. In several cases, such examination showed the presence of a small cord-like body in the sac, leading up to the hernial opening.

*Treatment.*—In view of the fact that complications of this variety of hernia are so frequent, occurring as they did in nineteen of the twenty-four cases, the radical cure would appear to be demanded in all instances. While strangulation—

the accident most frequently observed, treated symptomatically and expectantly—was recovered from spontaneously (Case I), no modern surgeon would for a moment consider such a course. An attempt at reduction of the strangulated tube by taxis, assisted by manipulations through the vagina, might be made under exceptional circumstances when operative conditions are very unfavorable, but otherwise not. Operation in uncomplicated hernia of the tube is no more dangerous than the operation for the radical cure of hernia of any other abdominal organ, and, as some accident may be confidently expected if an early cure is not effected, it is better to operate at once, rather than await a time when the local and general conditions are unfavorable for an aseptic operation.

Finally, what shall be done with the herniated tube when operation is undertaken? That it should be reduced and allowed to remain intact, if healthy, is self-evident. If gangrene has occurred, if there is any doubt as to whether or not the tube is viable, or if intratubal suppuration or other profound pathologic change has occurred, the tube should be removed. In treating a tube, the condition of which is doubtful, there is, of course, a much wider latitude permitted than in treating a loop of intestine under analogous circumstances. A tube can be removed with little or no damage to the patient, while resection of a damaged loop of intestine is always a serious operation.

After the fate of the tube has been decided and it has been treated accordingly, the further course will depend on the local condition. Naturally, the radical cure by one of the approved methods will be the course adopted whenever possible.

The following abstracts present a review of all the recorded cases. Whenever possible, the abstracts have been made from the original articles. Unfortunately, not all of these have been accessible. Reliance has therefore been placed on the collections of Lejars and of Schultz, who both give in extenso the histories to which they had access.

CASE I. (Voigt.)—Female, aged thirty-six years; VI-para. Had a hernia in the right inguinal region which had developed suddenly "while taking a long step, the body having been forcibly bent towards the right

inguinal region." One year after the appearance, during which time the hernia had given rise to no symptoms except irregular abdominal pains, while bending over and lifting a heavy weight, the hernia became irreducible. The patient made several inefficient attempts at reduction,—the tumor, however, increasing in size and becoming progressively painful. This was followed by fever, thirst, absence of stools, and vomiting. On the tenth day a fluctuating, tender tumor was found in the right inguinal region, about six inches long, having the volume of an infant's arm and a bluish color. Next day the swelling "opened," discharging a serous, fetid pus, the general condition of the patient improving at the same time. On the following day, a small, black, gangrenous body was found in the dressings, equal in size to a goose-quill and having a fimbriated extremity, by which it was recognized as the Fallopian tube. Recovery.

CASE II. (Bérard.)—Female, aged forty-five years. Has always been healthy, still menstruates regularly. Since two years patient noted a small tumor in the right groin which disappeared on pressure, but gradually increased in size, remaining reducible. Finally, the tumor became larger, irreducible, and painful. Examination at this time showed a tumor in the right groin a little larger than a hen's egg extending upward towards the abdomen and downward to the labium majus. It was irreducible, fluctuated, and transmitted light like a hydrocele. Palpation of the internal genitals showed a body about as large as a turkey's egg connected with the corpus uteri and recognized as a fibroid tumor of that organ. A diagnosis of crural hernia with hydrops of the sac was made. The sac was thought to contain some abdominal organ, probably a small part of the great omentum. Exploratory puncture allowed six or eight ounces of a clear fluid to escape. After evacuation, a small rounded body the size of a small hazel-nut could be felt at the base of the sac, occupying the crural ring and disappearing behind the crural arch.

The same day, shortly after the exploratory puncture had been made, the patient had a chill and the tumor became painful. On the third day, the latter showed all the characteristics of a phlegmon; there were vomiting, pain in the abdomen, followed by death on the seventh day. At the autopsy a seropurulent peritonitis was found. The neck of the sac passed through the crural ring, and within it the Fallopian tube was found in a somewhat hypertrophic condition. The ovary occupied its ordinary position in the pelvis, and no other viscera were found in the hernial sac.

CASE III. (Scholler.)—Female infant, well until twenty days old. Then refused nourishment, the respiration became difficult, and the lower part of the abdomen tumefied and tender; vomiting of greenish matter. Derivative treatment (leeches and calomel). On the evening of the same day, convulsions, death ensuing during the night. The autopsy showed an inguinal hernia of the right Fallopian tube. The tube was red and swollen, the round ligament a little shorter than that on the other side, and the uterus slightly displaced, its long axis not parallel to that of the body.

CASE IV. (Aubry.)—At the post-mortem examination of a woman seventy years old, a hernia of the Fallopian tube was found. The tube

had passed through the femoral ring and lay in front of the pectineus muscle, between the adductors and the femoral vessels. ("C'est une hernie à travers le ligament de Gimbernaut.")

CASE V. (Dolbeau).—The patient had a red, fluctuating, and tender tumor located in the inguinal region, which presented all the signs of an abscess of the inguinal canal. This swelling was incised and some pus escaped. Several days after, an intense peritonitis supervened, causing death. At the autopsy, a suppurating focus, situated external to the abdominal cavity, but communicating with it, was found. The pus collection was surrounded by a hernial sac, which contained in addition a serous cyst. This latter was not formed by the sac, but was distinct and separate from it. Incision permitted a little serous fluid to escape, when it was seen that the cyst had been developed from the Fallopian tube. The cyst and the purulent focus were situated in the inguinal canal, while the ovary was in the abdomen near the opening of the canal.

CASE VI. (Dupont).—Female, aged thirty-eight years. In fifth month of pregnancy presented a fluctuating tumor situated in the groin above Poupart's ligament. The tumor simulated a hernia, but there were no symptoms of strangulation. Exploratory puncture allowed a yellowish fluid to escape. Operation showed a sac containing a small body as thick as a finger, violet in color, and having all the characteristics of the Fallopian tube. Reduction of the herniated organ; successful; recovery.

CASE VII. (Féré).—Autopsy on a female child aged three weeks. On the left side, the canal of Nuck was obliterated, while on the right side, external to the ligamentum rotundum, was a hernial sac containing exclusively the fibrimated extremity of the Fallopian tube. The tube on this side measured forty-one millimetres in length against a length of thirty-seven millimetres on the left side. The hernia could not be felt on external palpation; it was easily reduced, but returned immediately after pressure was removed.

CASE VIII. (Lenz).—Female, aged fifty-two years. Had no hernia during youth, but since two years noticed a tumor on the left groin. During the three months preceding the occasion when the patient presented herself for treatment, there had been severe pains while she was doing her work. Examination showed a fluctuating, somewhat tender tumor in the left groin, the skin covering it being movable and normal in appearance. The tumor was irreducible; no impulse on coughing could be elicited. Diagnosis: Hydrocele of hernial sac, the neck probably obstructed by a mass of omentum. Operation: Incision of sac allowed a serous fluid to escape, when the neck of the sac was found to pass out from the crural canal, the neck itself being occupied by the fimbriated extremity of the Fallopian tube. About two or three centimetres behind the fimbriated extremity, the tube showed a constriction caused by the ring, which latter was very small. The fimbriated extremity was tumefied and bright red in color. Beside the tube, a small cyst having the size of a bean was found, which had been developed from the body of Rosenmüller. The tube and broad ligament were tied off and the extremity of the tube cut away.

CASE IX. (Brunner.)—Female, aged sixty-eight years. Multipara. No hernia noticed until she was fifty years old, long after the menopause. The hernia could never be completely reduced. It gradually increased in size, while at the same time there occurred cramp-like pains radiating towards the epigastrium. The condition finally became aggravated, the tumor becoming entirely irreducible. Finally, loss of appetite, insomnia, and irregular stools (but no vomiting) supervened.

Examination showed a distended tender abdomen. In the right inguinal region below Poupart's ligament was a tumor about as large as a hen's egg, very tender on palpation. Percussion yielded a tympanitic tone. Diagnosis: Crural hernia, with strangulation of an epiplocele. Operation: The hernial sac had an unusual appearance; its inferior extremity had a violet color, while its upper portion was covered by a solid yellow tumor separated from the sac by a deep constriction, and which on closer inspection was recognized as a subserous lipoma. The sac being opened, some clear fluid escaped, revealing the swollen and œdematous extremity of the Fallopian tube. After enlarging the hernial opening, the tube was easily reduced. The lipoma was isolated and extirpated. Healing by primary intention.

CASE X. (Brunner.)—Female, aged thirty-eight years. Married at twenty, and had two children. At the age of thirty, while working in the field during her menstrual period, she was taken with sudden severe pain in the right inguinal region, and then noticed for the first time a tumor the size of a walnut in the same region. Six years later, while again doing heavy work, a descent of the uterus developed, and at the same time the pain and tumor again appeared in the groin. The pain in the tumor increased during the menstrual period. Shortly afterwards, the pains became so severe that they prevented sleep, while the loss of appetite and continuous nausea supervened, the stools, however, remaining regular. Attempts at reduction being unsuccessful, the patient was taken to the hospital.

Examination at this time showed a solid, non-fluctuating, tender tumor in the right inguinal region, situated for the most part below Poupart's ligament, having the size of an egg. The skin was not adherent, but was reddened. Examination of the genitalia showed a hypertrophy of the cervix and a prolapse of the vagina. On vaginal examination, the right ovary was found slightly enlarged and very tender. Operation: An incision made perpendicular to Poupart's ligament showed the external coverings of the hernia to be thin and adherent among themselves. The sac having been opened, a clear fluid with a slightly red tinge escaped. Within the sac was a body having a deep red color resembling a cock's comb, and apparently made up of cavernous tissue engorged with blood. This body was recognized as the Fallopian tube, with a fimbriated extremity greatly swollen. By making traction on the tube, the ovary could be dragged forward, but it appeared to be perfectly normal. Healing of wound *per primam*.

CASE XI. (Picqué et Poirier.)—Female, aged seventy-eight years. Has been in the habit of carrying heavy weights and suffers from a com-

plete prolapse of the uterus. Some time before admission, during an attack of coughing, she noticed a pain in the left inguinal region which became more severe, while vomiting occurred at the same time. These symptoms disappeared after passage of flatus and fecal matter. After having had several similar attacks, one of greater severity supervened. This attack, occurring about six months after the first, was characterized by severe pain, fecaloid vomiting, and absolute obstipation.

Examination: At the most internal portion of Scarpa's triangle is a small, deeply situated, tender tumor. Behind the crural arch on a level with the ring is a thickening which is tender to pressure and gives to the palpating finger a sensation like that imparted by the great omentum. Diagnosis: "*Hernie crurale exceptionnelle, probablement pectinéale.*" Operation: Incision exposing pectineus muscle; nothing found; obturator hernia therefore suspected. The prolapse of the uterus was then reduced, and the finger, passed into the vagina, could feel a cord of omentum fixed at the obturator canal. The hernia was reduced by manipulation through the vagina and the original incision closed. Recovery.

About four weeks later, patient had an attack similar to above, which ended spontaneously after a few hours' duration. After another two weeks, another attack of strangulation occurred, which ended fatally. Autopsy showed an obturator hernia, the sac formed by peritoneum containing a knuckle of intestine, an epiplocele, and the tube with a part of its ligament.

CASE XII. (Broca.)—Female, aged forty years. Left crural hernia strangulated since thirty-six hours. Similar accident one month before. Sac opened and found to contain a large quantity of fluid and a strangulated knuckle of intestine accompanied by a congested Fallopian tube. Reduction of intestine was followed by reduction of sac and a radical cure of the hernia. Complete recovery.

CASE XIII. (Lejars.)—Female, aged thirty-nine years. During several days, patient had noticed a swelling in the right groin, which soon became painful and irreducible. This was followed by fever, continual nausea, and absence of stools, the abdomen at the same time becoming distended and tender. In the right groin, at the classic location of inguinal hernia, was a tumor as large as an egg, with a slightly red surface, very tender, and giving an obscure sense of fluctuation; it was completely irreducible. Examination of the genitalia showed nothing abnormal except a rounded mass situated behind the pubic bones, evidently a fibroma of the uterus. Operation showed the sac to contain a quantity of blood-stained fluid. Near the lower part of the sac appeared a cord-like body, deep red in color and blackened in places, extending upward into the ring. This was readily recognized as the Fallopian tube. The fimbriated opening was somewhat dilated, and the least pressure was sufficient to cause large drops of pus to appear from its lumen. The entire tube was thickened, hyperæmic, and red; the serous surface had lost its glistening appearance and was black in places, the organ giving off an offensive odor. The tube alone was in the sac, the ovary being in the abdominal cavity. After ligature, the gangrenous portion was cut away



and resection of the sac attempted. The latter was found adherent by its posterior layer to another layer of fibrous tissue which appeared at the upper and inner angle of the ring. This proved to be a part of the wall of the urinary bladder which had passed through the internal ring, in company with the hernial sac. Recovery.

CASE XIV. (Guinard et Dudefoy.)—Female, aged twenty-four years. At the age of twenty she was delivered with forceps after a labor of three days' duration. Eight days after delivery, she resumed her occupation of servant on the farm. At the end of three weeks, she began suffering with pains in the abdomen, and also noted the presence of a tumor in the left inguinal region which had appeared spontaneously. Since her above-mentioned labor, she has had a mucopurulent vaginal discharge constantly.

Examination showed a tender tumor in the left inguinal region, and connected with it a second tumor in the inguinal canal, which resembled a testicle retained in the same position. Diagnosis: Hernia of the tube and ovary. Cœliotomy showed a sausage-shaped mass adherent to the peritoneal sac. This mass was found connected with the left uterine horn by a portion of healthy Fallopian tube. Traction on the tube drew out the corresponding ovary, which was double the normal size. The tumor was enucleated, together with the ovary, the sac ligated and resected, and the walls of the canal and the skin sutured. Recovery.

Examination of the tube showed it to have the volume of a large sausage, and to have undergone the changes of parenchymatous salpingitis.

CASE XV. (Kousmine.)—Female, aged thirty-six years. Married at twenty-one. Menstruation always painful, becoming more so after marriage. After having been treated unsuccessfully for this trouble in the hospital, she addressed herself to a simple peasant woman who promised a complete cure by massage. To attain this end, firm pressure was made on the abdomen; then, the patient having been turned on her face, the masseuse jumped on the patient's back with her knees, directing the movements from above downward and from the sides towards the median line. Two days after this *séance*, a slightly prominent tumor was visible, situated below a line drawn from the spine of the os pubis to the anterior superior iliac spine. This tumor gradually increased in size until it obtained such dimensions that the patient was prevented from walking. Ten months after its appearance, the following conditions existed: At the superior and internal portion of the left thigh was a slightly compressible, fluctuating tumor about as large as a cocoanut, which ascended to and disappeared behind Poupart's ligament. Vaginal and bimanual examination showed the uterus inclined forward and to the left, and passing from the uterus towards the left groin a kind of pedicle could be felt. The corresponding ovary not palpable. Operation: After opening the sac a large quantity of seropurulent fluid escaped. This disclosed a cystic dilatation of the Fallopian tube, the external half of the tube only occupying the sac. Recovery.

CASE XVI. (Maydl.)—Female, aged forty-seven years. For the pre-

ceding six years, the patient had noticed a small tumor in the right inguinal region which had made its appearance after labor. She was accustomed to keep it reduced by wearing a truss, but while dancing, the latter slipped, whereupon the tumor increased in size and became irreducible. Examination: Below the inner third of Poupart's ligament was a smooth, elastic tumor, over which the skin was reddened. From this tumor a pedicle could be distinctly palpated which extended upward under the crural arch towards the abdominal cavity. The patient had vomited a number of times and there was constipation. Operation: Incision of the sac allowed the escape of a large quantity of hæmorrhagic fluid. A small body thus became apparent, which resembled a cherry in appearance. From it a pedicle could be traced upward into the femoral canal and a constriction could be felt above the pedicle. In the femoral canal lay a knuckle of the Fallopian tube, constricted at its base. The body first seen, which resembled a cherry, was a cyst of the uterine half of the tube. The strangulated portion of the tube consisted of a loop, which had passed back into the abdominal cavity after having first passed out through the crural ring, thus lying internal instead of external to the ring. Maydl calls this variety of strangulation "retrograde incarceration."

CASE XVII. (Walter.)—Baby, aged fourteen months. Since it was six weeks old, the mother noticed a swelling in the inguinal region. A bandage was worn for some months, the tumor reappearing when the child was nine months old. Operation: The hernia contained a loop of small intestine and the Fallopian tube strangulated moderately. Reduction, followed by recovery.

CASE XVIII. (Thomas.)—Female, aged thirty-six years. The patient had noticed a small lump in the left groin, which was easily reduced until seven months before she presented herself for examination, since when it had increased in size. A few days before the examination, "whilst lifting a box," she noticed a sharp pain in the back, which shot down towards the right groin and gradually increased in severity. At the same time a small swelling appeared in the *right* groin. This tumor could not be reduced into the abdomen. It was tender on manipulation and gradually increased in size. No vomiting or symptoms of strangulation.

At the operation which followed, the swelling on the left side was found to be an omental hernia which had passed through the femoral opening. Incision on the right side disclosed an irregular pouched sac distended with fluid, which escaped when the sac was opened. Thereupon "an octopus-like structure revealed itself, purple in color, the tentacles being very much swollen and œdematous. This was the fimbriated extremity of the Fallopian tube very much congested; the ovary was not seen or felt during the manipulation." Gimbernat's ligament (crural hernia) was nicked and the hernia reduced. Recovery.

CASE XIX. (Goepel.)—Female, aged sixty-two years; married forty years ago. One child at that time, not pregnant since. During the last twelve years a hernia appeared in the right inferior abdominal region

three or four times, and each time was easily reduced. Its appearance was accompanied by severe colicky pains, which disappeared when the hernia was reduced. On the evening of June 5, 1895, she was suddenly taken with a chill, followed by a cold sweat. This was followed by frequent, violent vomiting during the following twenty-four hours, distention of the abdomen, and obstipation; while at the same time the hernial tumor increased in size and became tender. Temperature,  $39.6^{\circ}$  C. Locally, examination showed a tumor the size of a hen's egg in the right inguinal region, slightly overlying Poupart's ligament. This tumor was soft and elastic in consistence and tympanitic on percussion. On exploring the genital organs, the uterus was found somewhat augmented in volume, in a position of strong anteversion and seemingly fixed. Bimanual examination impossible because of abdominal tenderness. Diagnosis: Right crural (or inguinal) hernia, with inflamed contents. (Inflamed epiplocele, parietal hernia, suppurating hernial sac?)

Treatment: Cœliotomy showed that a crural hernia was present, the sac containing a small amount of cloudy, yellowish, serous fluid. At the bottom of the sac was a small tumor the size of a hazel-nut, dark red in color, soft and elastic in consistency; and also a knuckle of herniated intestine. Closer examination showed the tumor to be made up of a more or less dilated Fallopian tube. It was isolated, and during the necessary manipulations was slightly torn and a few drops of pus escaped from its interior. The tube was cut away with the thermocautery, and the corresponding ovary, which was sclerotic, was also removed. Complete recovery followed.

CASE XX. (Jordan.)—Female, aged thirty-seven years. Menstruation always regular. Married, pregnant twice, last labor being followed by a vesicovaginal fistula. This was operated on many times by different operators, and was finally cured by Czerny. For several months before the present trouble, she suffered from aggravated constipation, which gradually increased in severity. On the 3d of August, 1896, the patient presented herself at the clinic for examination, thinking pregnancy had occurred, as there had been no menstrual discharge for six weeks. She was advised to return for re-examination after two months, but on the afternoon of the same day was taken with violent abdominal pains and vomiting. When seen, the patient was markedly anæmic, countenance anxious, the pulse small and frequent. The abdomen was tympanitic throughout and uniformly sensitive to pressure. On the left side, corresponding to the orifice of the external abdominal ring, a hernia was found as large as an apple, soft in consistence and dull on percussion, irreducible and tender. Vomiting and absolute constipation continued for two days, when the vomited matter became feculent in character. Operation being decided on, an incision was made on the left side exposing the hernial sac, which was found much thickened. When opened, numerous dark-colored clots were found, and after removal of these, a clear arterial hæmorrhage was seen. Further, there was found a fœtus seven and one-half centimetres long, which was removed with its envelopes; the latter were surrounded with loops of intestine. The tube and ovary of this side

were removed and the intestine treated in the usual way. Death after twenty-four hours.

At the autopsy, adhesions between the abdominal ostium of the left tube and a loop of small intestine were found, and on the right side a similar condition existed.

CASE XXI. (Jalaguier.)—Female child, aged nineteen months. Since the baby was six months old, the parents had noticed a swelling in the right groin, which apparently caused no pain. When the patient cried, an ovoid tympanitic tumor would appear at the external orifice of the inguinal canal, reduction of same being accompanied by a gurgling sound. Operation showed a sac formed by the canal of Nuck containing a knuckle of the Fallopian tube. Recovery.

CASE XXII. (Wiart.)—Female subject, aged two months (autopsy). After opening the abdomen, the uterus was found deviating markedly towards the right. The right tube and the corresponding tubo-ovarian ligament extended into the right internal inguinal ring, while the corresponding ovary rested within the abdominal cavity. On the left side, the internal inguinal ring was occluded by the fimbriated extremity of the left tube passing into it.

CASE XXIII. (De Francisco.)—K. J., aged thirty-two years. Since about one and one-half years ago patient has suffered from a hernia on the left side, which could not be retained perfectly by a truss, and often caused pain. Sometimes patient is constipated, but never has shown symptoms of strangulation. Status: In the left inguinal region a tumor about as large as a hen's egg appears when the patient coughs. It takes a direction towards the inguinal canal, and it cannot be brought out completely. Operation: Incision over the tumor down to the labium majus. The hernial sac was exposed and opened. In it was found a firm cord which proved to be an adherent tube. The tube was separated as much as possible; the sac separated from surrounding parts, closed completely with catgut sutures, and the stump replaced. Recovery.

CASE XXIV. (Morf, V. S.)

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# CONTRIBUTIONS TO THE SURGERY OF MALIGNANT DISEASE OF THE PROSTATE GLAND AND OF THE TONSILS.

By NATHAN JACOBSON, M.D.,

OF SYRACUSE, NEW YORK,

PROFESSOR OF CLINICAL SURGERY, COLLEGE OF MEDICINE, SYRACUSE UNIVERSITY; SURGEON TO ST. JOSEPH'S HOSPITAL.

## I.—PRIMARY CARCINOMA OF THE PROSTATE GLAND COMPLICATED WITH STONE IN THE BLADDER.<sup>1</sup>

So few cases of primary carcinoma of the prostate gland are recorded that the following one seems worthy of note:

J. A. V., aged sixty-one years, married thirty-four years, was referred to me by Dr. P. R. MacMaster of this city. His father died suddenly when patient was but eight years of age. His mother reached the ripe age of eighty-one. Aside from the death of a maternal uncle from consumption, family history was negative.

Except for the ordinary diseases of childhood, he had enjoyed good health until October, 1897. At that time he noticed a marked sediment in his urine. The following January or February he was seized, one day, with marked dysuria. He described the half-ounce of fluid discharged as being composed of equal parts of blood and brick-dust. Prior to this time there had been no difficulty whatsoever in voiding the urine. Throughout the night following the experience mentioned, he had a constant desire to urinate, but was unable to do so. In the morning a physician was summoned, but before his arrival the patient succeeded in emptying the bladder. From this time on he was compelled to urinate three or four times each morning, as often during the afternoon, but not so often at night. After this, hæmaturia was frequent and at times profuse. His condition

<sup>1</sup> Read at the annual meeting of the Medical Society of Central New York.

remained unchanged until June, 1898. At this time he was obliged to drive about the country considerably. He noticed that driving increased the amount of mucus and blood in the urine.

In August, 1898, he went into the Adirondacks. Drinking large quantities of spring water, and keeping reasonably quiet, he had less discomfort, and a freer discharge of clearer urine. At the time he consulted me, October 20, 1898, he had urinated every two hours during the day and every hour at night. He complained of some discomfort in the perineum and tenderness on pressure over the pubes, more marked on the left than on the right side. Ordinarily he would void about an ounce of urine at a time. He passed a catheter morning and evening. Each time he withdrew about four ounces of residual urine. The voluntary discharge of urine was attended with straining, but the patient complained of no marked pain attending or following it.

At my office he voided an ounce of urine, and immediately thereafter I withdrew with a rubber catheter three ounces more. That discharged was of reddish color, had a heavy precipitate, alkaline reaction, contained considerable albumen, and upon microscopic examination presented numerous triple phosphates, pus corpuscles, and red blood-cells. The residual urine had a specific gravity of 1015, and presented otherwise the same features. In each specimen there was a large amount of ropy mucus which could be raised with a glass rod.

Further examination of the patient was deferred until the following day, it being thought wise that he should rest after his journey to Syracuse.

October 21, 1898, the following condition was found: Suffering and loss of blood had greatly enfeebled him and made him quite anæmic. Locally, the prepuce was a little snug, the meatus patent; circumference of penis, three and one-half inches; urethral calibre, 35 French. Examination of the urethra with the Otis urethrometer, under cocaine, indicated slight constriction posterior to the fossa navicularis. A stone-searcher entered the bladder readily and recognized the presence of calculus. Digital examination per rectum revealed a very large prostate. This was indurated and nodular. The enlargement was more marked on the left than on the right side. The entire gland seemed to be fixed, and the rectum cemented to it. The

opinion was expressed that the gland was too hard and irregularly enlarged, and too immovable, to be simply hypertrophied, and that it was altogether probable that a malignant tumor was present.

The presence of stone in the bladder led me to suggest suprapubic cystotomy, in order that we might at the same time remove the stone and investigate the condition of the prostate. The preliminary examination was made at my office. The patient walked to his hotel, a distance of about five hundred feet. Immediately upon reaching his room he was given a hot sitz-bath and was put to bed. On the following day he felt sick. I did not see him until four o'clock in the afternoon, when I found his temperature  $104.5^{\circ}$  F., and pulse 120. I directed that his bladder be irrigated with a boric acid solution, and prescribed ten grains of urotropine, to be taken three times daily, together with one-fortieth grain strychnia.

The patient was unable to state whether he had been having fever prior to my examination, although he said that for a long time he had felt very weak and depressed, and had suffered a great deal from excessive thirst. After three days his temperature fell to normal in the morning and 100 in the afternoon.

The patient felt that he must return home to arrange his business affairs before submitting to the operation suggested. He was advised to continue taking urotropine, and to irrigate the bladder morning and night.

On the 20th of November he returned to Syracuse. He reported that he had felt better since giving more attention to the bladder. The urine upon examination was now found to be of light amber color, specific gravity 1017, faintly acid reaction; contained a marked sediment of mucus streaked with red; some albumen, and microscopically presented red blood-corpuscles. My re-examination, November 22, led me to enter in my notebook, "Digital examination of the prostate by rectum finds it intensely hard, nodular, infiltrated, and strongly impresses me with the belief that there is a malignant disease here."

November 23, 1898, the operation advised was performed, the usual preparations having been made. Dr. MacMaster administered the anæsthetic. The operation was done in the Trendelenburg posture. Prior to elevating him, the bladder was thoroughly irrigated with a saturated solution of boric acid. The



Petersen colpeurynter was introduced into the rectum and eight ounces of water injected into it.

The ordinary incision was made. The veins in the fatty tissue anterior to the bladder were very large. As the bladder was filled up with the ten ounces of fluid which it held, the right half was much more readily distended than the left. After securing the bladder temporarily, an opening was made of about an inch and a half. Two stones, each about three-quarters of an inch in diameter, were removed. The prostate was then examined. The vesical end of the urethra was invested with a collar of very dense, stony hard, nodular tissue, having a transverse diameter of from three to four inches. An incision was carried from the urethral orifice towards the base of the bladder and then forward over the presenting mass. With my index-finger I stripped off the mucous membrane from the underlying structures, and with some difficulty shelled out the prostate. The right lobe was removed more readily and completely than the left.

During this procedure the bleeding was very profuse. Upon completing it, however, it was readily controlled by irrigating the bladder with very hot water, and packing it for a few minutes with gauze sponges. The colpeurynter was removed, the patient lowered to the horizontal, and placed in the lithotomy position. Perineal section was made, and a No. 24 French soft rubber catheter introduced into the bladder through the perineal wound. The abdominal incision was closed by two tiers of sutures, chromicized catgut being used for the bladder, and six interrupted silkworm-gut sutures being carried through all of the structures. An opening was left in the anterior wall of the bladder of sufficient size to receive a second catheter. A small strip of gauze was carried into the prevesical space for drainage. Both catheters were secured in place, usual dressings applied, and the patient put to bed. A long rubber tube was connected with the perineal catheter through which the urine might drain into a vessel underneath the bed.

The patient's pulse was quite good, although his temperature remained subnormal for more than twelve hours after operation. During the week following the operation he had a daily rise of temperature ranging from 101° to 103° F. His pulse for this period was 100 to 108. There was marked pallor. For the first

four or five days the urine contained a good deal of blood. The bladder was irrigated every eight hours with a solution of boric acid. The fluid was introduced into the upper drainage tube and discharged through the lower. The patient drank large quantities of water.

After the first week there was marked improvement in all his manifestations. He would occasionally have a slight rise of temperature, but the pulse showed each day more strength, and after the 3d of December varied but little from 76 in the morning and 88 in the evening. A mild phlebitis occurred in the left lower extremity, but was of brief duration. The sutures were removed December 10; the drainage tube from the anterior opening, December 14,—that is, three weeks after the operation,—and a week later perineal drainage was withdrawn. Each of the wounds closed slowly. The opening in the abdominal wall showed much fickleness. It would heal over and then break out again. After January 1, 1899, the patient sat up each day. He had to be catheterized until January 21, on which day my notes read: "He has voided his urine freely many times to-day, while with the catheter only a drachm of residual urine was found. The urine is clear, and through neither fistula has there been any perceptible leakage during the twenty-four hours. Patient is up most of the time, and feels very much stronger." He left the hospital January 26, returning to his home in Potsdam, where he came under the observation of Dr. James S. McKay. I have received the following notes of the subsequent course from Dr. McKay: "From January 26 to March 27 he remained about the same as he was the last two weeks he was in the hospital, except that the abdominal opening remained patent all the time.

"March 27. Hæmorrhage into the bladder; four ounces of blood. This weakened him.

"April 1. Perineal incision red, swollen, and painful; opened up, and urine and a small amount of blood passed through it all the while. His stomach is troubling him. A great deal of nausea and some vomiting. Unable to take regular food. A few ounces of milk and seltzer during twenty-four hours.

"April 5. Seemed better. Took food, and until April 17 was doing fairly well.

"April 17. Had another hæmorrhage into the bladder,

which was slight; but fecal matter was noticed in the bladder, and coming from the perineal opening. This continued until May 2, when he had a fatal hæmorrhage."

Apparently after his return home there was a further outbreak of the malignant process, which not only produced ulcerative changes in the bladder, but led to a perforation into the rectum, and the consequent fecal leakage mentioned. No autopsy was held.

Of the prostatic growth removed at the time of operation, the pathologist, Dr. Kieffer, submits the following report: "Macroscopically the gland is seen to be much enlarged and indurated. Its weight is nearly eight drachms as compared with the normal gland, which is six drachms. Sections were made and stained with eosin and hämalaun for microscopic examination. Stained specimens examined under the microscope show marked increase in the size and number of the epithelial elements, which have in places broken through the limiting membrane, invading the muscular tissue. While the alveoli in the normal gland are lined with a single layer of columnar epithelia, in this specimen you will notice that the alveoli are completely filled with very much larger epithelial cells containing a large granular nucleus, which is quite typical of carcinoma. In two or three places is seen a deposit of calcareous salts and epithelial elements."

Mr. W. H. Walmsley, of Philadelphia, has made for me a photomicrograph of one of the sections, which is shown in Fig. 1.

The prostate gland, so frequently the seat of hypertrophy, is only rarely the primary site of malignant disease. There have recently appeared in German literature two articles bearing upon this subject; the one by Frisch, of Vienna, in the elaborate work edited by Nothnagel under the title of "*Specielle Pathologie und Therapie*;" the other, still more recent, a very critical review of the subject by Dr. Richard Wolff, of Berlin, in the *Deutsche Zeitschrift für Chirurgie* for September, 1899.

Frisch did not apparently investigate the reported cases with the same thoroughness as did Dr. Wolff. The latter includes only those in which the diagnosis was verified either post mortem or on the operating table.

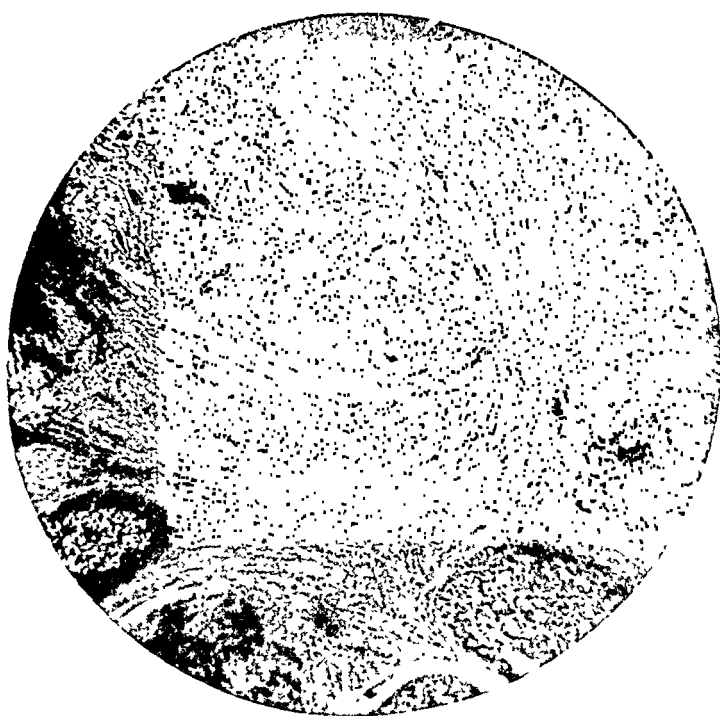


FIG. 1.—Carcinoma of prostate gland.



There is perhaps good reason to believe that many cases have been overlooked in the past; that the malignant disease has not always been recognized, and that it possibly has been often erroneously considered to be simply hypertrophy. With the present tendency to deal surgically with prostatic disease, no doubt a larger number of malignant tumors of the prostate will be recognized.

Malignant tumors of the prostate may be either primary or secondary. The secondary tumor may be the result of extension from neighboring organs, most frequently the rectum; or it may be in reality a metastatic manifestation. It is almost the rule that we do not have extension of malignant disease from the bladder to the prostate. Sperling found that in thirty-nine cases of primary carcinoma of the bladder the disease had extended to and involved the prostate in only two.

Sarcoma of the prostate does not seem to occur as frequently as carcinoma. Wolff was able to gather but twenty cases in which the diagnosis was positive, and seven in which it was probable. Of the twenty, two occurred during the first year of life, three additional times it appeared in the first, and as often in the second and third decennium, so that eleven out of the twenty cases occurred before the thirtieth year of age. One appeared at fifty, six between sixty and seventy-three, and in two the age was not stated.

Sarcoma of the prostate pursues a very rapid course, usually covering a period of from three to six months. Only twice in this group did it exceed a year. One of these cases (the patient fifty years of age) was cured by prostatectomy, having been operated upon by Socin. In children the tumor grew much larger than in the aged. In the former, one tumor reached the level of the umbilicus, while in the latter the prostate at most attained the size of the fist. The tumor is usually of the round-celled variety. It frequently extended into the bladder, fragments being cast off and discharged with the urine. Twice it involved the rectum. Metastases of the bones were quite common.

Wolff carefully investigated the sixty-seven cases of car-

cinoma of the prostate he records. Of these only ten appeared before the fiftieth year, fifty-two between the fiftieth and ninetieth years, one at a still later period, and in four the age was not mentioned. In all but two cases the prostate was found enlarged. The growth was usually general. In nine cases reference is made to enlargement of the middle lobe only. The average size was that of an orange. The prostate was usually nodular. These nodules Guepin distinguishes from the enlargements found with hypertrophy, inasmuch as the latter, under rectal massage, disappear or can be reduced, and with their reduction in size there is an expulsion of prostatic secretion. Occasionally you have a cystic collection with prostatic cancer. Should it be possible in this condition to force a discharge out of the prostate, purulent streaks or an admixture of blood will be found in it. Section of a carcinomatous prostate presents a white surface where purely carcinomatous tissue is present, and one that is grayish white where smaller carcinomatous masses are traversed by strips of prostatic tissue. Two old cases are described as presenting melanotic discoloration. In consistence, carcinoma of the prostate is firm, may grate on section; while in other instances we may have soft gelatinous masses in areas of firm prostatic tissue.

In sixty-four cases in which it was possible to note an extension of the disease, it was found that the bladder was involved twenty-eight times, the rectum eight, the urethra once, the seminal vesicles thirteen times, and in three the left seminal vesicle was alone involved. Seven times a tumor projecting into the bladder was found connected with the prostate. In only ten or eleven of the sixty-four cases was there any record of ulceration. The disease infiltrated rather than destroyed the tissues. The pelvic lymphatics were involved thirty-one times, the superficial only six.

Guyon has described a form of diffuse prostatopelvic carcinoma. The very rich lymphatic vascularity which Sappey has shown the prostate to possess, with its generous pelvic anastomosis, is evidently responsible for the rapid invasion of the whole pelvis found in this form of carcinoma. It is usually

soft to the touch, may be of unequal consistence in various parts, yielding at some parts the sense of fluctuation, at others being firm and nodular, and presenting a definite outline. Metastases seem to occur often in prostatic carcinoma. In 20 per cent. of the sixty-four cases metastatic disease of bones is mentioned. The pleura was involved six times, the liver six, the lungs four, the penis three, the kidneys two, the supra-renal capsules once, and the spleen once.

As complicating conditions, cystitis, prostatic hypertrophy, hydro- or pyonephrosis have been frequently encountered. Death from uræmia is the usual termination. Some patients have been carried away with bronchopneumonia, and others with rectal obstruction.

Microscopically, great poverty of connective tissue is found. Alveoli in this tissue are not frequently encountered. In the glandular zones little heaps of carcinomatous cells are seen, separated from each other by strips of smooth muscular tissue mixed with connective tissue.

The clinical picture varies somewhat from that of sarcoma. The course is less rapid. Of forty-six cases in which the period of disease was mentioned, in eighteen it covered less than a year, in thirteen from one to two years, in four more than two years, in eleven three years or over, and one patient had had bladder symptoms for sixteen years. Ordinarily, the disease began with the sluggish discharge of urine, especially at night, and on arising in the morning. Polyuria was usually present. Pain in the region of the bladder, presumably due to spasm, was a frequent complaint. At times there was retention, and in some cases the incontinence of retention. The urine was, as a rule, purulent and ammoniacal. Hæmaturia is mentioned in only twenty-one cases. Half of this number had used a catheter, and frequently bleeding was associated with instrumentation. Guyon's tumor ordinarily reached a large size before the hæmaturia appeared. The bleeding was of moderate degree. It would continue for a few days and with only rare periods of repetition. In five cases rectal obstruction was more marked than the urinary. A



significant point is the occurrence of much pain not associated with either urination or defecation. This pain extends along the course of the branches of the sacral and lumbar plexuses, and may be a very early manifestation. There are a few cases in which the metastases made their presence manifest before the primary trouble was suspected. In one there was a growth from the vault of the skull, and in another, of the epididymis, without preceding manifestations of prostatic disease. In fact, it seems to have been the rule that, at the time of the primary examination of most of the cases, the tumor had attained such size that the finger when carried into the rectum could no longer circumscribe it. It has been suggested that bimanual examination of the prostate be made with one hand over the pubes, or that a sound could be carried into the urethra to aid the finger in the rectum in determining the outlines of the prostate. It is evident that a tumor in the anterior part of the prostate might remain concealed a long time, and, indeed, cases are recorded in which the growth presented itself ultimately over the symphysis. There is often such marked lateral compression of the urethra that a retention catheter cannot be worn. The gland may be exceedingly tender, and acute crises of pain, with marked vesico-urethral irritability, occur. The cystoscope has been of but little service except where the bladder is implicated. As a rule, the general condition of the patient is not much altered. Cachexia was noticed in but eighteen of the sixty-four cases, death being usually due to local disturbances rather than to general implication.

In the way of differential diagnosis, fibroma is said to present a firmer, smoother surface, is more sharply circumscribed, and there is no glandular involvement. In hypertrophy the prostate does not attain as great a size, the swelling is smoother, firm, but not as hard as carcinoma; more chronic, while the manifestations are all milder. The pains are due to cystitis or dysuria. The nodular masses can be reduced by massage, and no infiltration of the rectal structures occurs. Prostatic stone produces irritation or inflammation, and the presence of it can be recognized by instrumentation with or

without conjoined digital examination per rectum. In prostatic tuberculosis we find irregularly nodular masses, with little enlargement. The nodules can be felt as separate from the tissues in which they are embedded, and vary in size from a pea to a bean. The seminal vesicles are thickened, and usually tubercular disease of the vas, epididymis, and testicles is present. There may be pulmonary implication also.

The co-existence of stone in our patient without doubt changed the complex of symptoms. His first manifestation was sudden retention of urine. While this is a frequent occurrence in sarcoma of the prostate in children, it is most infrequent in adults. Usually there is gradually increasing dysuria. Nor had he any pain which could not be accounted for by the existing cystitis. His most constant manifestation was hæmaturia. This had been so frequent and profuse as to have caused profound anæmia at the date of my primary examination. The local changes, however, in the prostate were to me sufficiently marked to indicate that we were dealing with no ordinary form of prostatic enlargement. Recognizing the presence of stone in the bladder, it seemed to me that the proper course to pursue would be to perform suprapubic cystotomy in order that we might at the same time remove the stone, investigate the condition of the prostate, and, if possible, radically treat the condition found.

The results of operation for prostatic cancer have been as yet very discouraging. The disease has, as a rule, been recognized so late that little hope of radical relief could be anticipated.

Billroth is credited with having performed the first radical operation. His patient lived fourteen months, and then died of recurrence. Frisch refers to seven other cases,—two by Czerny, one dying on the twelfth day after operation, of pneumonia, and one nine months after operation, of uræmic poisoning; one by Leisrink, who died on the thirteenth day after operation, of exhaustion; one by Depage, who lived but nine days; one by Verhoogan, dying nine months later; and one each by Pyle and Fuller, the details of which were not given.

Reference is made to a case by Kuester, in which he extirpated the bladder, prostate, seminal vesicles, and implanted the ureters in the rectum. Death followed five days after operation, of bronchopneumonia.

Ordinarily, it is stated that the functioning power of the bladder does not return. This was not the case with our patient. He was able to empty his bladder completely before he left the hospital.

Of the cases referred to by Wolff, but five are gathered from American literature. Without doubt a much larger number has come under the observation of American surgeons. The five cases referred to by him are as follows, they being included in his extracts from "English Literature:"

Case 5. Tyson: American Journal of the Medical Sciences, 1869; Vol. xlviii, p. 440.

Case 9. Wessler: St. Louis Medical and Surgical Journal, 1882.

Case 22. Belfield: Journal of the American Medical Association, p. 118, 1888.

Case 23. Beach: Boston Medical and Surgical Journal, 1888.

Case 25. Whitney: Boston Medical and Surgical Journal, 1893.

## II.—MALIGNANT DISEASE OF THE TONSILS.<sup>1</sup>

CASE I.—Primary sarcoma of the tonsil; lateral pharyngotomy; recovery.

S. D.; aged thirty-one years; Austrian; day-laborer; married. Referred to me by Dr. T. H. Halsted, June 20, 1900. On several occasions during the past three or four years he had attacks of quinsy, from which he fully recovered, but requiring always evacuation of the pus. Eighteen months ago had what was again called quinsy. An incision was made, with temporary relief. Ever since there had been a sense of fulness in the throat and some difficulty in swallowing. A mass steadily increasing in size has been present. About February 1, 1900, while in Austria, the swelling was again incised, but without

<sup>1</sup> Read at a meeting of the Laryngological Society of Medicine, December 18, 1900.

affording any relief. His general health has not been much disturbed, although he has lost some flesh. Difficulty in swallowing and pain extending to left ear were the most distressing symptoms. His voice is thick and muffled.

Examination showed left tonsil to be greatly enlarged, reaching down to, and apparently involving, the base of the tongue. The tumor extended across the median line. Its vertical diameter was about three inches, its anteroposterior about one and three-quarters, the transverse two inches.

The tumor invaded the anterior and posterior pillars, but did not extend above the arch. It was in the main nodular and hard, but at some points less firm, and indeed elastic. No ulceration anywhere. The cervical lymphatic glands of the same side were extensively involved. There was no specific history, nor evidence of specific disease.

He had been under the care of Dr. Halsted since the 1st of May, 1900. The patient was given large doses of iodide of potassium. A small piece of the tumor removed from its surface with the cold snare was sent to Dr. Kieffer for pathological study. He reported it to be non-malignant. But the steady advance of the growth in size, its invasion of the surrounding structures, as well as its suspicious appearance, led Dr. Halsted to the conclusion that the case was one of sarcoma. He therefore requested me to remove the malignant mass, which I did June 22, 1900, with his assistance and that of Dr. Dayan, at St. Joseph's Hospital.

Almost with the beginning of anæsthesia cyanosis became so extreme that tracheotomy was imperatively demanded. The venous bleeding attending this step was very profuse, but ceased with the introduction of the tracheotomy tube. Chloroform was the anæsthetic used. The patient's head was held in a dependent position throughout the operation.

An incision was made along the inner border of the sternomastoid, beginning at a point a little back of the angle of the jaw, and continued downward to the upper border of the thyroid cartilage. To remove the large glandular mass in the submaxillary triangle, a second incision had to be carried upward over the lower jaw on a line with the angle of the mouth. The veins in this triangle were enormously distended. These were doubly ligated and severed between the ligatures.

After removing the diseased lymphatic glands, I proceeded

to expose the external carotid, and tied its facial and lingual branches. I cut through the muscles of the floor of the mouth and exposed the tumor. The mouth was held open by a gag, and an assistant attempted to push the mass down to me. Its adhesions to the soft palate, the lateral wall of the buccal cavity, to the floor of the mouth, and the lateral surface of the tongue, as well as its invasion into the neck as far as the hyoid bone, rendered the growth quite immovable. It was impossible to save the hypoglossal nerve, as it was embedded in the tumor. I cut away the muscles of the upper hyoid group at their attachments to the hyoid bone. It was very evident that the tumor, on account of its size, could not be removed without section of the lower jaw. After extraction of the second molar tooth, I divided the inferior maxilla with the chain-saw directly in front of the last molar. Drawing the severed ends of the inferior maxilla apart, I cut away with a scissors the tumor from the palate and the other structures to which it was attached. A number of vessels required ligation. Oozing continued until it was arrested by dusting suprarenal extract into the wound. The jaw was secured by wiring, the wires being carried around the necks of the teeth.

The wound was closed by interrupted silkworm gut and catgut sutures, and drained through the outer part of the incision with a strip of iodoform gauze.

During the latter part of the operation an intravenous saline injection was given. He was put to bed in good condition, and stimulants were administered hypodermically and per rectum.

For the first three days after operation his nourishment was administered entirely by rectum. The patient's recovery was interrupted by a mild pneumonia which began immediately after operation. During this period the temperature rose to between  $101^{\circ}$  and  $103^{\circ}$  F., and the pulse and respiration were correspondingly accelerated. A profuse foul expectoration necessitated the wearing of the tracheotomy tube for nine days. The wound in the trachea healed kindly.

The wiring failing to hold the severed ends of the jaw satisfactorily, Dr. Dayan took an impression of the jaw and made an interdental splint, which worked admirably, permitting him immediate use of the jaws. This was applied on the 7th of July.

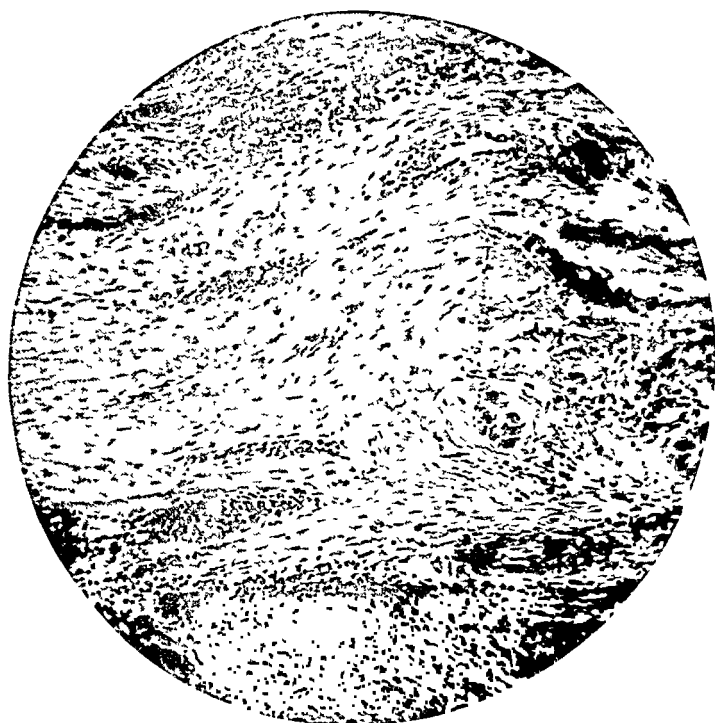


FIG. 2.—Small round-cell sarcoma of tonsil.



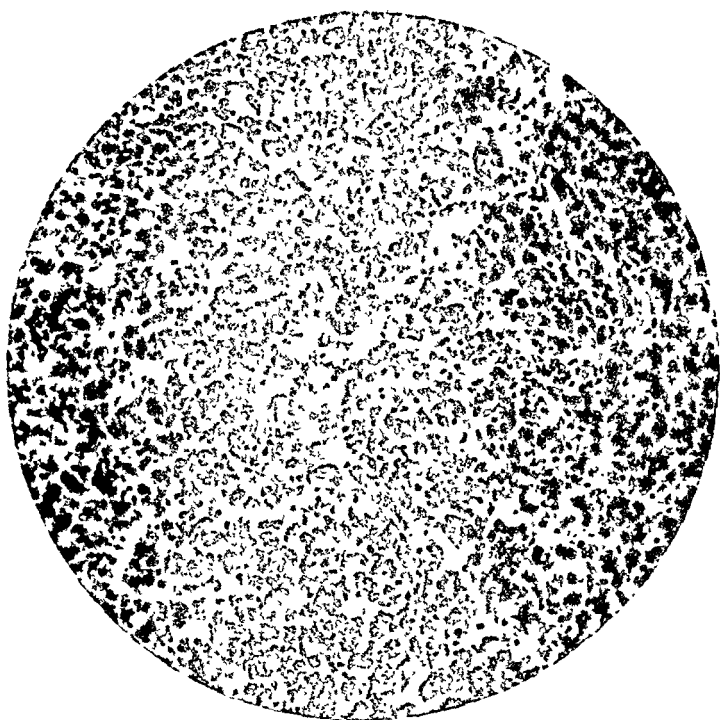


FIG. 3.—Small round-cell sarcoma of tonsil.





His general condition steadily improved. He weighs thirty pounds more than at the time of operation. There was a slight paralysis of the lower part of the face, which has disappeared. The left half of the tongue, however, is atrophied and paralyzed.

Repair of the jaw was delayed because of a superficial periostitis of the cut surfaces of bone. Some exfoliation of bone has occurred, but now the jaw is firmly united and strong.

Dr. Theo. L. Kieffer, who as stated made the first microscopic examination, made sections of the growth after its removal, and pronounced it to be a small round-celled sarcoma.

Through the kindness of Mr. W. H. Walmsley, of Philadelphia, I am able to present two photomicrographs of sections of the sarcoma, of 110 and 170 diameters magnification. (Figs. 2 and 3.)

CASE II.—Epithelioma of tonsil; removed by cold wire and galvanocautery loop; no recurrence after eleven years.

G. K.; operated upon at his home in Otisco, New York, November 14, 1889. The patient, a farmer sixty-one years of age, had a negative family history and had always enjoyed good health. For a year there had been steadily increasing dysphagia. He was brought to me by his physician, Dr. F. W. Sears, who likewise assisted me at the operation. His left tonsil was as large as a small hen's egg. Its faucial surface presented a characteristic epitheliomatous ulcer. The growth did not invade any surrounding structures. Internally it extended to the uvula. There was great difficulty in swallowing. Upon assuming the recumbent position, breathing was greatly impeded. No cervical lymphatics were involved.

Two previous efforts had been made by other surgeons to remove the growth. On each occasion general anæsthesia had been attempted, but had to be abandoned because of the strangulation it occasioned. I therefore injected a 4 per cent. solution of cocaine into the tonsil. Hooking a tenaculum into the gland, I drew it inward as far as possible. Next, I passed a piano-wire loop, threaded in a snare, about the tonsil, carrying it well to its outer side, and slowly screwed it down as tightly as I could. Maintaining this compression, I brought a galvanocautery loop over the tonsil close to the outer side of the cold wire, and cut off the mass with the hot wire at the point of constriction. There was no bleeding. The patient made a prompt recovery.

Sections of the tonsil showed it to be an epithelioma. The case, with the specimen and microscopic slides, was presented to the Syracuse Medical Association December 10, 1889.

Eleven years have now elapsed and the patient has had no recurrence, and lives in the enjoyment of perfect health.

It is not my intention to consider all of the interesting questions suggested by these two cases. I have, however, gone quite thoroughly into the literature of malignant disease of the tonsil, and have tabulated the cases to which I have had access. This table by no means includes all recorded cases; and yet I believe it presents the details of a sufficient number to warrant, upon analyzing it, our reaching certain definite conclusions.

Williams<sup>1</sup> collected the statistics of four London hospitals covering a period of nine to fourteen years, during which time 10,100 tumors had been treated in them. Of this number but nine were primary tumors of the tonsil, and of these only one proved to be a sarcoma. Bosworth,<sup>2</sup> in his very exhaustive work, states that he had never met a case of sarcoma of the tonsil. That malignant disease of this gland is uncommon must be conceded; yet Newman<sup>3</sup> was able to refer to 144 cases he had found recorded in surgical literature.

It appears that youth and adolescence are almost entirely exempt from malignant disease of this gland, and that it is usually encountered between the fortieth and seventieth years. It is singular that the left is more frequently attacked than the right tonsil, and that it occurs in men much oftener than in women.

In the early stages the tumor does not always present a characteristic appearance. Very frequently its resemblance to a chronic inflammation has not only led to this diagnosis, but, laboring under this misconception, tonsillotomy has been repeatedly performed, only to be followed by prompt recurrence of the growth. Our first case was several times incised, without, of course, any relief following the incisions.

Another way in which we are apt to be misled in reaching a diagnosis is to depend upon the pathologic study of a

small piece removed from the surface of the growth. In our case of sarcoma, Dr. Kieffer found nothing to warrant the diagnosis of malignancy in the small fragment removed with the snare, but very promptly recognized the sarcomatous character of the tumor after its removal.

The frequency with which we find the cervical lymphatics involved secondarily in sarcoma of the tonsil is generally recognized. MacCoy, discussing this subject at a meeting of the American Laryngological Association in 1888, and reviewing the then recorded cases, concluded that glandular implication precluded radical operation.

The consensus of professional opinion of that time was expressed by Butlin in his work on the "Operative Surgery of Malignant Disease." His conclusions were:

(1) The prospect of permanent relief by operation is small, if indeed there be any.

(2) Operation through the open mouth is not dangerous, but in no case has there been a cure; in several, temporary relief.

(3) Removal by external pharyngotomy has not yielded as good results as through the mouth, and cannot be recommended for future cases.

It seems to me that the study of the appended table cannot but convince us that the gloomy prognosis of thirteen years ago is not warranted to-day. The question of the relative danger of operating through the open mouth and by external pharyngotomy is by no means the point of greatest importance. We are rather to concern ourselves with the problem of the complete removal of the infected area. The same rule must be applied in operating upon the throat as for malignant tumors in other parts of the body. The operation must be radical whatever be the route.

In reviewing the twenty-nine cases of our table in which the malignant tonsil was removed through the mouth by one of the many methods described, only three have outlived the two years' limit without recurrence. In one of these by Gorecki (17) the thermocautery was used. This patient remained well

two years. I am unable to find any subsequent record of this case.

The second case is, to my mind, one of the most remarkable. Newman (74) attempted the removal of the mass by incision of the palate and blunt dissection of the tonsil. It was so broken down that he failed. He resorted, therefore, to the Volkmann spoon, curetted away what he could, and cauterized the whole surface with the Paquelin cautery. There was no local recurrence, but four and one-quarter years later sarcoma appeared in the opposite tonsil.

My own case, reported in this paper, has, I believe, outlived a longer period than any other. Eleven years have elapsed and no local nor remote sign of recurrence has appeared. The method of combining the use of the cold and hot wire employed in this case seems to me worthy of further trial.

We are therefore in a position to contradict Butlin's statement that no case has ever been cured by operation through the open mouth. However, the fact, that not to exceed 10 per cent. of cures have been effected by this route, is certainly not encouraging.

It offers hope only to such cases in which there is no glandular infection, and where the disease is limited to the tonsil and does not invade the other structures of the throat.

A modification of this method of reaching the diseased area consists in splitting the cheek from the angle of the mouth to the attachment of the masseter to the lower jaw. Five operations of this kind are included in the table. Three of these died and two were lost sight of.

There can be no question that external or lateral pharyngotomy is a much more serious procedure, indeed, an operation of considerable magnitude. It should be borne in mind that the class of cases amenable only to this surgical procedure embraces the more advanced forms of the disease. When Cheever (4) made public his case, February 25, 1869, he had every reason to believe that it was the first of its kind, for no other one had then been published. But H. Jeter, in reviewing this subject in Virchow's Jahresbericht for that year, tells us that

both Langenbeck and himself had performed a similar operation in 1865, neither of which, however, had been previously put on record. The patient of the former surgeon recovered from the operation; what subsequent course the case pursued, I am unable to learn. Hueter's patient was advanced six months in pregnancy, and died, three weeks after operation, of pneumonia.

There are in our table twenty-four cases in which external pharyngotomy has been performed. Not less than four of these appear to have been radically cured. Of them, Richardson (51) reported one without recurrence for two years. One operated by Park (84) remained free two and one-half years; one by Genzmer (18) had no return in three years; and one by McBurney (91) was also well at the expiration of three years. To this list should be added the case of Fowler (54), in which there was no local recurrence, but the patient died of cancer of the stomach.

It should also be mentioned that two patients operated upon by Mikulicz (30 and 33) did not die of recurrence until two and one-half years after the primary operation. Cheever has called attention to the fact that after lateral pharyngotomy recurrence is more apt to be cervical than faucial, and hence much less distressing.

It is very evident that our statistics prove quite the opposite of Butlin's statement, and that external pharyngotomy affords far better prospect for permanent cure than operation through the mouth, and is to be recommended for future cases. To obtain still better results will require earlier diagnosis and more prompt reference of the patient to the surgeon.

That these cases differ in their degree of virulence can be readily seen by referring to the collated cases. Some evidently are so intensely malignant that no operation can be of avail. Fortunately, both of my cases showed no such intense malignity,—one being of a year's, the other probably eighteen months' duration.

As to the details of operative technique, a few words may be in place. Preliminary tracheotomy, it seems to me, is more

often indicated than not. Mickulicz expresses himself strongly in its favor. In Case I we had no choice in the matter. It simply had to be performed, or all further operative procedure abandoned.

The particular incision in a given case will be indicated by the extent of secondary glandular involvement. Whether the hypoglossal nerve can be saved must also depend upon the area invaded. In our case of sarcoma it was so thoroughly embedded in the secondary glandular disease that it had to be sacrificed.

Inflammation and delay in repair of the severed portion of the jaw in our case is apparently not unusual. Genzmer<sup>4</sup> states that the inferior maxilla had been divided twelve times after the method of Langenbeck at the clinic of Halle, and in each slow consolidation of bone had occurred.

I desire particularly to call attention to the vast superiority of the interdental splint over wiring the severed or fractured ends of the inferior maxilla. It permits free movement of the bone and immediate use of the jaw for mastication. Of course, it cannot be applied to the bone if divided at the angle.

#### REFERENCES.

- <sup>1</sup> London Lancet, May, 1884.
- <sup>2</sup> Diseases of Nose and Throat, ed. 1892 and 1897.
- <sup>3</sup> American Journal of the Medical Sciences, May, 1892.
- <sup>4</sup> Verhandlung der Congress der deutschen Gesellschaft für Chirurgie, 1879.

#### TABLE OF REPORTED CASES OF MALIGNANT DISEASE OF THE TONSILS, ESPECIALLY THOSE WHICH HAVE BEEN SUBJECTED TO OPERATION.

No. 1.—*Year*, 1865. *Operator and Reference*, Langenbeck: Reported by Hueter in Jahresbericht der Gesamnten Medicin, 1869, Vol. ii, p. 435. This operation, done in 1865, first of its kind. *Diagnosis*, sarcoma. *Operation*, external pharyngotomy, with section of jaw. *Result*, recovered from operation, but no subsequent report.

No. 2.—*Year*, 1869. *Age and Sex*, seventeen, female. *Side*, left. *Operator and Reference*, Billroth: Archiv für klinischen Chirurgie, 1869, Vol. x, p. 105. *Diagnosis*, lymphosarcoma. *Duration*, fifteen months. *Operation*, none. *Result*, death.

No. 3.—*Year*, 1869. *Operator and Reference*, Hueter: Jahresbericht

der Gesamten Medicin, 1869, Vol. ii, p. 435. *Diagnosis*, sarcoma. *Duration and Extent*, operated when six months pregnant. *Operation*, external pharyngotomy, with section of jaw. *Result*, death; pneumonia third week after operation.

No. 4.—*Year*, 1869. *Age and Sex*, thirty-four, male. *Operator and Reference*, Cheever: Boston Medical and Surgical Journal, February 25, 1869. *Duration and Extent*, six months; diseased gland under angle of jaw. *Operation*, first, tonsillotomy; after recurrence, lateral pharyngotomy. *Result*, recurrence, with ulceration of surface after tonsillotomy; in three weeks double its former size; no return five months after external operation.

No. 5.—*Year*, 1870. *Age and Sex*, seventeen, male. *Side*, left and right. *Operator and Reference*, Milani: Gazette Med. Ital.-Lombard, Milan, 1870, Vol. xxx, pp. 17, 18. *Diagnosis*, lymphosarcoma. *Duration and Extent*, five months; upper external base of skull; lower on epiglottis; anterior surface ulcerating; right tonsil secondarily involved. *Operation*, none. *Result*, death from suffocation.

No. 6.—*Year*, 1871. *Age and Sex*, thirty-four, male. *Side*, right. *Operator and Reference*, Schroetter: Jahresbericht der Klinik für Laryngologie, Wien, 1871. *Diagnosis*, lymphoadenoma. *Duration*, several months. *Operation*, tonsillotomy. *Result*, recurrence with invasion of cervical lymphatics.

No. 7.—*Age and Sex*, twenty-nine, male. *Side*, right. *Operator and Reference*, Schroetter: Jahresbericht der Klinik für Laryngologie, Wien, 1871. *Diagnosis*, medullary lymphosarcoma. *Duration and Extent*, six months; tonsil and both submaxillary glands enlarged. *Operation*, none. *Result*, rapid growth, hæmorrhages, death.

No. 8.—*Age and Sex*, forty-five, male. *Side*, left. *Operator and Reference*, Schroetter: Jahresbericht der Klinik für Laryngologie, Wien, 1871. *Diagnosis*, sarcoma. *Extent*, pedunculated tumor. *Operation*, by mouth. *Result*, recurrence after one year, filling whole pharynx, also cervical lymphatics.

No. 9.—*Age and Sex*, sixty-one, male. *Side*, left. *Operator and Reference*, Moxon: Transactions of the London Pathological Society, Vol. xx, p. 369. *Diagnosis*, lymphosarcoma. *Extent*, tonsil; cervical glands; spleen also. *Operation*, none. *Result*, death.

No. 10.—*Year*, 1871. *Side*, both. *Operator and Reference*, Schroetter: Jahresbericht der Klinik für Laryngologie, Wien, 1871. *Diagnosis*, medullary lymphosarcoma. *Operation*, injection into one tonsil, tinct. iodine; into other, tinct. iron.

No. 11.—*Year*, 1873. *Age and Sex*, eighteen, male. *Side*, right. *Operator and Reference*, Goodhart: Transactions of the Pathological Society, London, 1873, Vol. xxiv, p. 90. *Diagnosis*, sarcoma. *Extent*, tonsil and cervical glands. *Operation*, none. *Result*, death in nine weeks from hæmorrhage.

No. 12.—*Year*, 1875. *Age and Sex*, fifty-three, male. *Side*, left. *Operator and Reference*, Winiwarter: Archiv für klinischen Chirurgie, 1875,



Vol. xviii, p. 150. *Diagnosis*, sarcoma. *Extent*, tonsil and cervical lymphatics. *Operation*, none. *Result*, death two and one-half months later.

No. 13.—*Year*, 1877. *Age and Sex*, sixty-six, male. *Side*, left. *Operator and Reference*, Quintin: *Annal. de Soc. Médecine de Gand.*, February, 1877. *Diagnosis*, cancer. *Duration and Extent*, three to four years; tonsil size of hen's egg; supraclavicular glands. *Operation*, with écraseur. *Result*, no recurrence three months later.

No. 14.—*Year*, 1878. *Age and Sex*, eighteen, male. *Side*, left. *Operator and Reference*, Zsigmondy: *Aerzt. Bericht. des K. K. Allg. Krank. zu Wien*, 1878, p. 15. *Diagnosis*, round-celled sarcoma. *Extent*, tonsil size of hen's egg. *Operation*, galvanocautery. *Result*, no final report.

No. 15.—*Age and Sex*, thirty-four, male. *Side*, left. *Operator and Reference*, Czerny: *Beiträge zur Operat. Chirurg.*, 1878, p. 60. *Diagnosis*, lymphosarcoma. *Duration and Extent*, twelve weeks; disease extends from tonsil into back of pharynx. *Operation*, lateral pharyngotomy; division of jaw; recurrence base of tongue. *Result*, recurrence six weeks; second operation; death; hæmorrhage.

No. 16.—*Age and Sex*, fifty-three, male. *Side*, right. *Operator and Reference*, Lennox Browne: *Transactions of the Pathological Society*, London, 1878, Vol. xxix. *Diagnosis*, lymphosarcoma. *Extent*, right tonsil; behind it fleshy mass. *Operation*, pieces removed with galvanocautery loop. *Result*, prompt recurrence; death from hæmorrhage three months after.

No. 17.—*Year*, 1879. *Age and Sex*, forty-six, male. *Side*, right. *Operator and Reference*, Gorecki: *Le Practicien*, 1879, Vol. ii, p. 177. *Diagnosis*, lymphadenoma. *Duration and Extent*, three months; tonsil. *Operation*, thermocautery. *Result*, no recurrence two years later.

No. 18.—*Side*, right. *Operator and Reference*, Genzmer: *Berliner klinische Wochenschrift*, 1879, p. 247. Presented at German Surgical Congress, April 17, 1879. *Diagnosis*, sarcoma. *Extent*, tonsil size of hen's egg; two-thirds soft palate and postpharyngeal wall. *Operation*, lateral pharyngotomy, with section of jaw. *Result*, two and three-fourths years later no recurrence; necrosis, cut surfaces; bone union only after one year.

No. 19.—*Year*, 1879. *Age and Sex*, twenty-nine, male. *Side*, right. *Reference*, *American Journal of the Medical Sciences*, 1879, Vol. lxxviii, pp. 24-126. *Diagnosis*, sarcoma (?). *Duration*, nine years. *Operation*, through mouth. *Result*, no recurrence after six months.

No. 20.—*Year*, 1880. *Age and Sex*, fifty-one, female. *Side*, left. *Reference*, *Bericht. der K. K. Krankenanstalt Rudolfstiftung in Wien*, 1880, p. 349. *Diagnosis*, sarcoma. *Duration and Extent*, three months; tonsil. *Operation*, by mouth.

No. 21.—*Year*, 1882. *Age and Sex*, seventy-four, female. *Side*, right. *Operator and Reference*, West: *Transactions of the Pathological Society*, London, 1882, Vol. xxxiii, p. 331. *Diagnosis*, sarcoma. *Duration and Extent*, two months; cervical glands, tonsil, spleen, and heart; sarcomatous; extended between jaws, so could not close them. *Operation*, none. *Result*, five months after first symptoms, death.

No. 22.—*Age and Sex*, twenty-three, male. *Operator and Reference*, La Grange: Progrès Médical, 1882, Vol. x, p. 53. *Diagnosis*, round- and spindle-celled sarcoma. *Duration and Extent*, three months; faucial isthmus filled by tonsil. *Operation*, evulsion. *Result*, death three months later.

No. 23.—*Age and Sex*, sixty, male. *Side*, left. *Operator and Reference*, Weinlechner: Wiener medicinische Presse, 1882, Vol. xxiii, p. 1389. *Diagnosis*, sarcoma (?). *Duration and Extent*, four months; glands of neck. *Operation*, injection of iodoform and ether; ligature of common carotid. *Result*, disappearance under injection, etc.

No. 24.—*Age and Sex*, forty-five, male. *Side*, left. *Operator and Reference*, C. H. Golding-Bird: Transactions of the Clinical Society, London, October 13, 1882. *Diagnosis*, epithelioma. *Duration and Extent*, three months; saucer-shaped, fungating mass; constricted where clamped by faucial pillars; two hard nodules back of tongue; cervical lymphatics involved. *Operation*, external pharyngotomy, with incision from angle of mouth down to the one along border of sternomastoid; hypoglossal not seen in course of operation; ligature; facial mass removed by galvanocautery. *Result*, stiffness of jaw, requiring wedge to open daily; recurring mass cauterized with galvanocautery; further recurrence.

No. 25.—*Side*, left. *Operator and Reference*, C. H. Golding-Bird: Transactions of the Clinical Society, London, October 13, 1882. *Diagnosis*, epithelioma. *Extent*, secondary to carcinoma of tongue. *Operation*, galvanocautery. *Result*, recurrence in tongue, not tonsil.

No. 26.—*Age and Sex*, fifty-seven, male. *Side*, left. *Operator and Reference*, C. H. Golding-Bird: Transactions of the Clinical Society, London, October 13, 1882. *Diagnosis*, epithelioma. *Duration and Extent*, one year; involved tonsil, tongue, soft palate, cervical lymphatics. *Operation*, none.

No. 27.—*Year*, 1882. *Age and Sex*, fifty, male. *Side*, left. *Operator and Reference*, C. H. Golding-Bird: Transactions of the Clinical Society, London, October 13, 1882. *Diagnosis*, epithelioma. *Duration and Extent*, three months; tonsils; oral pharynx. *Operation*, none.

No. 28.—*Year*, 1883. *Age and Sex*, sixty, male. *Side*, left. *Operator and Reference*, Jardin: Inaugural Dissertation, Bonn, 1883, p. 26. *Diagnosis*, lymphosarcoma. *Duration and Extent*, nine months; cervical glands; primary in tonsil, secondary in left mamma. *Operation*, none.

No. 29.—*Age and Sex*, thirty-five, female. *Side*, right. *Operator and Reference*, Jardin: Inaugural Dissertation, Bonn, 1883, p. 26. *Diagnosis*, lymphosarcoma. *Duration and Extent*, five months; tonsil; lymphatic glands, deeply adherent. *Operation*, none; injection, osmic acid.

No. 30.—*Age and Sex*, sixty-five, female. *Side*, left. *Operator and Reference*, Mikulicz: Deutsche medicinische Wochenschrift, 1886, No. 10; operation, May 27, 1883. *Diagnosis*, carcinoma. *Duration and Extent*, one and one-half years; tonsil, with mass of glands under angle of jaw. *Operation*, external pharyngotomy, with section of ramus of jaw. *Result*, two and one-half years later, recurrence, invading palate choanæ, cervical glands.

No. 31.—*Year*, 1884. *Age and Sex*, fifty-three, female. *Side*, left. *Operator and Reference*, Balding: *Lancet*, 1884, Vol. ii, p. 320. *Diagnosis*, round-celled sarcoma. *Duration and Extent*, one month; tonsil; cervical and submaxillary glands; suppuration, two months; epiglottis. *Operation*, none. *Result*, death in six months.

No. 32.—*Operator and Reference*, Cazzolini: Morgagni, June, 1884. *Diagnosis*, lymphosarcoma. *Operation*, galvanocautery. *Result*, no recurrence after six months.

No. 33.—*Age and Sex*, sixty-one, male. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, No. 10; operation, March 5, 1884. *Diagnosis*, carcinoma. *Extent*, extended into soft palate, to edge of hard palate; inner angle of jaw, size of fist. *Operation*, external pharyngotomy, with resection of ascending ramus. *Result*, death two and one-half years later: hæmorrhage.

No. 34.—*Age and Sex*, fifty-four, male. *Side*, right. *Operator and Reference*, Clutton: *Transactions of the Pathological Society*, London, Vol. xxxv, p. 157. *Diagnosis*, lymphosarcoma. *Duration and Extent*, four months; tonsil and cervical glands.

No. 35.—*Year*, 1884. *Age and Sex*, forty-two, male. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, Vol. x; operation, October 6, 1884. *Diagnosis*, carcinoma. *Duration and Extent*, four months; left tonsil; ulcerating tumor of arches of palate; lateral walls of pharynx down to epiglottis; glandular tumor angle of jaw. *Operation*, resection of ascending ramus of inferior maxilla, preserving masseter and pterygoids; lateral pharyngotomy, tracheotomy, œsophageal tube. *Result*, secondary hæmorrhage sixth day, requiring ligature of carotid; rapid extension.

No. 36.—*Age and Sex*, fifty-one, male. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, Vol. x; operation, October 6, 1884. *Diagnosis*, carcinoma. *Duration and Extent*, six months; ulcerating tumor of tonsil, involving root of tongue, soft palate, submaxillary glands both sides.

No. 37.—*Age and Sex*, forty-eight, female. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, Vol. x; operation, October 6, 1884. *Diagnosis*, carcinoma. *Extent*, ulcerating tumor, involving palate, pharyngeal wall to epiglottis, cervical glands.

No. 38.—*Age and Sex*, sixty-three, male. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, Vol. x; operation, October 6, 1884. *Diagnosis*, carcinoma. *Extent*, ulcerating tumor, involving posterior pharyngeal wall to epiglottis.

No. 39.—*Age and Sex*, forty-six, male. *Side*, left. *Operator and Reference*, Mikulicz: *Deutsche medicinische Wochenschrift*, 1886, Vol. x; operation, October 6, 1884. *Diagnosis*, carcinoma. *Duration and Extent*, three months; ulcerating tumor of tonsil, soft palate, base of tongue, extending to upper and lower jaws; glands size of hen's egg.

No. 40.—*Year*, 1885. *Age and Sex*, seventy-four, female. *Side*, right. *Operator and Reference*, Barker: *Transactions of the Pathological Society*, London, 1885, 1886, Vol. xxxvii, p. 218. *Diagnosis*, first called quinsy; lymphosarcoma. *Duration and Extent*, three months; tonsil and cervical

lymphatics, nodules in the tongue. *Operation*, incision of neck to remove gland in neck; Paquelin cautery and blunt dissection through mouth. *Result*, recurrence in neck, not in throat; death four months after operation.

No. 41.—*Year*, 1885. *Sex*, male. *Operator and Reference*, Barker: Transactions of the Pathological Society, London, 1885, 1886, Vol. xxxvii, p. 218. *Diagnosis*, lymphosarcoma. *Extent*, limited to tonsil; no glandular implication. *Operation*, through mouth; blunt dissection. *Result*, no recurrence four months later.

No. 42.—*Side*, right. *Operator and Reference*, Scheuerlen: Berliner Dissertation, 1885. *Extent*, right tonsil nearly filled fauces; pressed on epiglottis. *Operation*, operated by Bergman.

No. 43.—*Age and Sex*, sixty-four, male. *Side*, left. *Operator and Reference*, Donaldson: Medical Record, March 7, 1885. *Diagnosis*, carcinoma; at first considered simple hypertrophy. *Duration and Extent*, six weeks; no ulceration at first, with recurrence in tongue, faucial pillars, cervical lymphatics. *Operation*, cold snare; recurrence, galvanocautery loop. *Result*, further recurrence until condition was inoperable.

No. 44.—*Year*, 1886. *Age and Sex*, forty-six, male. *Side*, right. *Operator and Reference*, Clark: Glasgow Medical Journal, 1886, Vol. xxv, pp. 139-146. *Diagnosis*, spindle-celled sarcoma. *Duration and Extent*, seven years; whole oral pharynx to opposite side; for two years, glands enlarged and faucial tumor suppurating from epiglottis to base of skull. *Operation*, tracheotomy. *Result*, death.

No. 45.—*Age and Sex*, twenty-eight, male. *Side*, right. *Operator and Reference*, Mikulicz: Deutsche medicinische Wochenschrift, 1886, Vol. xii, p. 157. *Diagnosis*, sarcoma. *Duration and Extent*, three months; tissues of neck. *Operation*, preliminary tracheotomy, lateral pharyngotomy, œsophageal tube. *Result*, death three months after operation.

No. 46.—*Age and Sex*, seventy-two, male. *Side*, right. *Operator and Reference*, Pollard: Operated by Beck; Transactions of the Pathological Society, London, Vol. xxxvii, p. 221. *Diagnosis*, round-celled sarcoma. *Duration and Extent*, three months; tonsil; enlarged lymphatics, angle of jaw. *Operation*, blunt dissection; neck glands not operated. *Result*, no recurrence four months after removal.

No. 47.—*Year*, 1887. *Age and Sex*, seventeen, male. *Side*, right. *Operator and Reference*, Croly: Transactions of the Academy of Medicine, Ireland, 1887, Vol. v, p. 161. *Diagnosis*, sarcoma, mistaken for quinsy early. *Duration and Extent*, six weeks; soft palate to larynx, cervical glands. *Operation*, tracheotomy; cautery to throat; excision of glands. *Result*, recurrence six weeks; death six months.

No. 48.—*Age and Sex*, fifty, male. *Side*, left. *Operator and Reference*, Croly: Transactions of the Academy of Medicine, Ireland, 1887, Vol. v, p. 161. *Diagnosis*, mistaken for quinsy; sarcoma. *Extent*, hæmorrhage. *Operation*, none. *Result*, died of inanition.

No. 49.—*Age and Sex*, fifty-three, male. *Side*, right. *Operator and Reference*, Lennox Browne: Author's work. London, 1887. *Diagnosis*, lymphosarcoma. *Extent*, tonsil. *Operation*, galvanocautery several times. *Result*, death from hæmorrhage.

No. 50.—*Side, left. Operator and Reference, Lange: Medical News, 1887. Diagnosis, round- and spindle-celled sarcoma. Operation, lateral pharyngotomy; section of jaw.*

No. 51.—*Year, 1888. Age and Sex, sixty, female. Operator and Reference, Richardson: Boston Medical and Surgical Journal, 1888, Vol. cxviii, p. 197; also, Transactions of the American Surgical Association, 1889. Diagnosis, round-celled sarcoma. Operation, lateral pharyngotomy, without opening into fauces. Result, well two years later.*

No. 52.—*Age and Sex, sixty, male. Side, right. Operator and Reference, Weinlechner: Aertzt. Bericht. des K. K. Allg. Krankenhaus zu Wien, 1888, p. 208. Diagnosis, sarcoma. Duration and Extent, one year; tonsil, anterior pillar of fauces, and soft palate ulcerated. Operation, section of cheek and ramus of jaw; subsequent hæmorrhage and ligature of common carotid. Result, death soon after.*

No. 53.—*Age and Sex, forty-five, female. Side, right. Operator and Reference, MacCoy: Transactions of the American Laryngological Association, 1888, p. 129. Diagnosis, sarcoma. Duration and Extent, anterior pillar of fauces, uvula, left tonsil; later, posterior pharyngeal wall, base of tongue, cheek, gums. Operation, none. Result, death.*

No. 54.—*Operator and Reference, Fowler: Brooklyn Medical Journal, September, 1888. Diagnosis, carcinoma. Duration and Extent, nine months; left tonsil, cervical lymphatics. Operation, lateral pharyngotomy; ligature facial and lingual arteries and external jugular vein. Result, no local recurrence; eight months later recurrence in right carotid gland; death, cancer of stomach.*

No. 55.—*Year, 1889. Age and Sex, fifty-seven, male. Side, left. Operator and Reference, Cheever: Transactions of the American Surgical Association, 1889, Vol. vii, p. 57. Diagnosis, round-celled sarcoma. Duration and Extent, one year; tonsil, cervical lymphatics. Operation, lateral pharyngotomy. Result, recurrence in neck; throat remained healthy.*

No. 56.—*Age and Sex, six, male. Side, right. Operator and Reference, Gray: American Journal of the Medical Sciences, 1889, New Series, xcvi. Diagnosis, alveolar sarcoma; early mistaken for hypertrophy. Extent, gum, soft palate, and opposite tonsil. Operation, none. Result, death.*

No. 57.—*Age and Sex, seventy-two, male. Operator and Reference, Vander Veer: Medical Record, May 25, 1889; Transactions of the American Surgical Association, 1889. Diagnosis, sarcoma. Duration and Extent, four months; tonsil. Operation, tonsillotomy. Result, recurrence in eight months; death, pneumonia.*

No. 58.—*Age and Sex, fifty-one, male. Side, left. Operator and Reference, Koerte: German Surgical Congress, 1889. Diagnosis, carcinoma. Extent, tonsil and left half soft palate. Operation, hanging head; section with knife, soft palate; with finger, tonsil. Result, recurrence in glands of neck in three months, right side; in left, seven months; after their removal, free four years.*

No. 59.—*Age and Sex, fifty, male. Side, right. Operator and Reference, Haviland Hall: Transactions of the Clinical Society, London, Feb-*

ruary 8, 1889. *Diagnosis*, epithelioma. *Extent*, deep excavation; slowly ulcerating tonsil; glands; angle of jaw. *Operation*, none.

No. 60.—*Age and Sex*, sixty-one, male. *Side*, left. *Operator and Reference*, Jacobson, November 26, 1889. Presented to Syracuse Medical Association; not published until now. *Diagnosis*, epithelioma. *Duration and Extent*, one year; no glandular or other involvement. *Operation*, cold wire and galvanocautery loop. *Result*, patient living, with no recurrence, eleven years after operation.

No. 61.—*Age and Sex*, forty-five, male. *Operator and Reference*, Conner: Transactions of the American Surgical Association, 1889. *Diagnosis*, sarcoma. *Duration and Extent*, three months; soft palate, tonsil. *Operation*, cheek split.

No. 62.—*Age and Sex*, twenty-six, female. *Operator and Reference*, Conner: Transactions of the American Surgical Association, 1889. *Diagnosis*, sarcoma. *Operation*, none. *Result*, death in few days.

No. 63.—*Year*, 1890. *Age and Sex*, fifty-five, male. *Side*, right. *Operator and Reference*, White: American Journal of the Medical Sciences, 1890, Vol. xcix, p. 414. *Extent*, cauliflower excrescence on right tonsil filling pharynx. *Operation*, preliminary laryngotomy; cheek split; discharged after three weeks. *Result*, no final report.

No. 64.—*Age and Sex*, twenty-three, male. *Side*, right. *Operator and Reference*, G. Hunter Mackenzie: British Medical Journal, June 21, 1890. *Diagnosis*, sarcoma; early resemblance to tonsillitis marked. *Duration and Extent*, six weeks; tonsil enlarged and sloughing of cervical glands. *Operation*, none. *Result*, death about three months after first seen.

No. 65.—*Age and Sex*, fifty-nine, female. *Side*, right. *Operator and Reference*, J. Homans: Boston Medical and Surgical Journal, October 30, 1890. *Diagnosis*, round-celled sarcoma. *Duration and Extent*, eighteen months; swelling and ulcerated tonsil. *Operation*, first, tonsillotomy; later, pharyngotomy.

No. 66.—*Side*, right. *Operator and Reference*, Thorburn: British Medical Journal, April 19, 1890. *Diagnosis*, epithelioma. *Extent*, tonsil, fauces, soft palate. *Operation*, pharyngotomy. *Result*, recurrence three months later.

No. 67.—*Age and Sex*, forty-five, male. *Side*, left. *Operator and Reference*, Downie: British Medical Journal, May 3, 1890. *Diagnosis*, epithelioma. *Duration and Extent*, eight months; ulcerated tonsil, anterior pillar of fauces. *Operation*, none.

No. 68.—*Age and Sex*, forty-two, female. *Side*, left. *Operator and Reference*, Speen: British Medical Journal, May 7, 1890. *Diagnosis*, epithelioma. *Duration and Extent*, ten weeks; no structure but tonsil. *Operation*, tonsillotomy. *Result*, prompt recurrence; extension of ulceration; death in six weeks.

No. 69.—*Age and Sex*, twenty-three, male. *Side*, right. *Operator and Reference*, G. Hunter Mackenzie: British Medical Journal, June 21, 1890. *Diagnosis*, at first called subacute tonsillitis; round-celled sarcoma. *Duration and Extent*, six weeks; later, sloughing tonsil, cervical lymphatics. *Operation*, none. *Result*, death in three months.

No. 70.—*Year*, 1891. *Age and Sex*, forty-five, male. *Side*, left. *Operator and Reference*, J. Wolff: Berliner klinische Wochenschrift, No. 16, 1891. *Diagnosis*, carcinoma. *Extent*, tonsil size of dove's egg, ulcerating the left half of soft palate. *Operation*, through mouth, cutting away left half of palate and separating tonsil with finger Koerte plan. *Result*, no recurrence fifteen months later.

No. 71.—*Year*, 1892. *Age and Sex*, fifty-seven, male. *Side*, left. *Operator and Reference*, Weeks: Transactions of the American Surgical Association, 1892. *Diagnosis*, sarcoma. *Duration and Result*, six months; glands in neck involved; one, two-thirds size of hen's egg; another, surface ulcerating. *Operation*, external pharyngotomy; section of jaw. *Result*, bone exfoliation; well one year later.

No. 72.—*Age and Sex*, seventy, male. *Side*, right. *Operator and Reference*, Weeks: Transactions of the American Surgical Association, 1892. *Diagnosis*, sarcoma. *Extent*, side of tongue; anterior half arch of fauces; tonsil ulcerating. *Operation*, split cheek. *Result*, died one year after operation.

No. 73.—*Age and Sex*, sixty-four, male. *Side*, right. *Operator and Reference*, R. C. Lucas: Transactions of the Clinical Society, London, October 13, 1892. *Diagnosis*, epithelioma. *Extent*, had had double popliteal aneurism; ulcerating right tonsil, side of tongue; no enlarged glands. *Operation*, split cheek; whole area removed; Paquelin cautery. *Result*, no recurrence in mouth; extensive glandular implication five months later.

No. 74.—*Age and Sex*, fifty-seven, female. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, spindle-celled sarcoma; first considered chronic tonsillitis. *Duration and Extent*, four months; no involvement outside of tonsil. *Operation*, through mouth; attempted incision through palate and blunt dissection failed; Volkmann spoon; cauterized, Paquelin. *Result*, no recurrence for four and one-fourth years; then appearance in right tonsil, with rapid invasion of palate, pharynx, and glands.

No. 75.—*Age and Sex*, fifty-four, male. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, lymphosarcoma. *Extent*, rapid extension to palate, pharynx, tongue, glands. *Operation*, none. *Result*, death in five months, from hæmorrhage.

No. 76.—*Age and Sex*, forty-one, male. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, gumma, which later became sarcomatous. *Extent*, involved soft palate, pharynx, glands. *Operation*, small pieces removed; no radical operation. *Result*, death.

No. 77.—*Age and Sex*, forty, male. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, extensive glandular involvement. *Operation*, none.

No. 78.—*Age and Sex*, forty-seven, female. *Side*, left. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, rapid involvement of glands;

cachexia marked. *Operation*, none. *Result*, died six days after admission into hospital.

No. 79.—*Year*, 1892. *Age and Sex*, sixty-one, male. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, soft palate involved in six weeks, glands in eight. *Operation*, refused. *Result*, death from hæmorrhage and exhaustion.

No. 80.—*Age and Sex*, sixty, male. *Side*, left. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, ulceration of palate and tonsil; enlarged lymphatics. *Operation*, none.

No. 81.—*Age and Sex*, sixty-five, male. *Side*, left. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, tonsil, posterior pillar, uvula. *Operation*, excision with galvanocautery knife. *Result*, no recurrence eighteen months later.

No. 82.—*Age and Sex*, seventy, male. *Side*, right. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, slow extension from tonsil to gums and glands. *Operation*, none. *Result*, severe hæmorrhage; death.

No. 83.—*Age and Sex*, fifty-one, female. *Side*, left. *Operator and Reference*, Newman: American Journal of the Medical Sciences, May, 1892. *Diagnosis*, epithelioma. *Extent*, tonsil ulcerated, involving anterior pillar, soft palate, uvula.

No. 84.—*Year*, 1893. *Age and Sex*, fifty-eight, male. *Side*, left. *Operator and Reference*, Park: Medical Record, August 26, 1893. *Diagnosis*, early chronic tonsillitis; round-celled sarcoma. *Extent*, ulcerated tonsil; infiltrated and ulcerated soft palate, faucial pillars; cervical lymphatics. *Operation*, external pharyngotomy; section of jaw; tracheotomy; cauterized; Paquelin cautery. *Result*, no recurrence two and one-half years after; small sinus remaining.

No. 85.—*Age and Sex*, thirty-one, male. *Side*, right. *Operator and Reference*, Park: Medical Record, August 26, 1893. *Diagnosis*, small round-celled sarcoma. *Duration and Extent*, five months; size of small orange; cervical lymphatics each side enlarged. *Operation*, tracheotomy; external pharyngotomy; ligature of common carotid; removed nearly all of soft palate; section of jaw. *Result*, death fourth day after operation; exhaustion.

No. 86.—*Operator and Reference*, Park: Medical Record, August 26, 1893.

No. 87.—*Year*, 1893. *Age and Sex*, fifty-one, male. *Operator and Reference*, Park: Medical Record, August 26, 1893. *Extent*, tumor size of billiard-ball, ulcerated; external tumor also suppurating. *Operation*, none. *Result*, death.

No. 88.—*Age and Sex*, fifty-three, female. *Side*, left. *Operator and Reference*, Raymond Johnson: Clinical Society, London, 1893; reported in Medical Record, New York, September 2, 1893. *Diagnosis*, lympho-sarcoma. *Duration and Extent*, six months; tonsil one and one-half inches by seven-eighths inch; surface covered by papillary processes; soft cervical



lymphatics, angle of jaw. *Operation*, external incision; preliminary ligature exterior carotid; second operation for removal of glands in neck three weeks later. *Result*, six months later, recurring glands in neck removed; no recurrence in throat eight months after operation; some enlarged glands either side of neck.

No. 89.—*Year*, 1894. *Age and Sex*, fifty-eight, female. *Operator and Reference*, J. Solis-Cohen: Medical News, January 27, 1894, Vol. lxiv, p. 99. *Diagnosis*, sarcoma. *Duration and Extent*, three and one-half years; covered by and adherent to soft palate; no glands involved. *Operation*, cocaine anæsthesia; soft palate divided with galvanocautery knife, tumor by evulsion and scissors. *Result*, not given.

No. 90.—*Year*, 1895. *Sex*, male. *Side*, left. *Operator and Reference*, Fowler, Brooklyn Surgical Society, December 12, 1895, and Brooklyn Medical Journal, Vol. x, p. 319. *Diagnosis*, sarcoma. *Duration and Extent*, four months, left tonsil and fauces. *Operation*, external pharyngectomy, ligation facial and lingual arteries and external jugular vein. Temporary recovery; recurrence. Held in abeyance one year by Coley's toxins. Finally, further local recurrence and death.

No. 91.—*Year*, 1896. *Age and Sex*, sixty-three, male. *Side*, left. *Operator and Reference*, McBurney: Practitioners' Society, New York, January 3, 1896; Medical Record, February 8, 1896. *Diagnosis*, carcinoma. *Duration and Extent*, six months; superficial ulceration of surface of tonsil; mucous membrane reddened, cedematous; glands on angle of jaw size of hen's egg. *Operation*, preliminary tracheotomy; ligature of external carotid; lateral pharyngotomy; section of jaw. *Result*, no recurrence three years later.

No. 92.—*Year*, 1897. *Sex*, female. *Operator and Reference*, Fowler: Items of Interest, January, 1897. *Operation*, external pharyngectomy. Interdental splint to hold severed jaw in place.

No. 93.—*Year*, 1900. *Age and Sex*, forty-nine, male. *Side*, left. *Operator and Reference*, C. B. Porter: Boston Medical and Surgical Journal, March 22, 1900, Vol. cxlii, p. 297. *Diagnosis*, sarcoma. *Duration and Extent*, four months; tonsil, cervical glands. *Operation*, preliminary tracheotomy; external pharyngotomy. *Result*, five days after operation, facial paralysis.

No. 94.—*Age and Sex*, thirty-one, male. *Side*, left. *Operator and Reference*, Jacobson, December 18, 1900. Presented to Syracuse Academy of Medicine; not reported until now. *Diagnosis*, small round-celled sarcoma. *Duration and Extent*, eighteen months; tonsil three inches by one and three-fourths inches by two inches, extending to base of tongue, invading anterior and posterior pillars of fauces; cervical glands involved. *Operation*, preliminary tracheotomy; lateral pharyngotomy; ligature of facial and lingual arteries. *Result*, no recurrence eight months after operation.

No. 95.—*Age and Sex*, fifty-three, male. *Side*, right. *Operator and Reference*, Butlin: "Sarcoma," p. 195, Case 4. *Diagnosis*, sarcoma. *Duration and Extent*, three months; tonsil, cervical glands. *Operation*, écraseur. *Result*, two recurrences; death in nine months.

# RESECTION OF THE PENDULOUS, FAT ABDOMINAL WALL IN CASES OF EXTREME OBESITY.

By LINDSAY PETERS, M.D.,

OF BALTIMORE, MARYLAND.

ON May 15, 1899, Dr. Kelly exhibited to the Johns Hopkins Hospital Medical Society an enormous mass of skin and fat weighing 7450 grammes, which he had removed from the abdomen of a very obese woman (see Johns Hopkins Hospital Bulletin, 1899, Vol. x, p. 197).

This case brings up the question of the advisability of resorting to an operation in those patients who are occasionally seen in whom the accumulation of subcuticular fat in the abdomen gives rise to a protruding, pendulous mass which practically amounts to a benign neoplasm of the anterior abdominal wall.

The condition may cause all the inconvenience and annoyance which a true lipoma in the same region would produce, and in such cases the disturbance from the weight of the mass, the undue fatigue from locomotion, the possible interference with marital relations and the distressing irritation of the skin, even aside from æsthetic considerations, at times furnish abundant cause to justify resection of the mass, although there be no complicating condition which would necessitate an abdominal operation. It would seem, therefore, that this operation should have a place in surgery, its field being limited, however, to extreme cases in which the patient seeks relief from the unwieldy and annoying condition, and the relief cannot be obtained by means of an abdominal support.

In the patient from whom the specimen referred to above was removed, the extreme obesity was associated with transient

glycosuria, apparently of a lipogenic or dietetic origin. The woman was a Jewess, Mrs. M. (Gyn. No. 6901), thirty-two years of age, who entered the service of Dr. H. A. Kelly at the Johns Hopkins Hospital in May, 1899, with the complaint of "excessive fat over the lower part of the abdomen." She gave the following history:

She had been married eight years and had given birth to one child, which lived only a short time after birth. This was her only pregnancy, and it was perfectly normal, as were also the labor and puerperium.

Menstruation began at thirteen or fourteen years of age and was always regular, at intervals of four weeks, lasting three days without pain.

Her mother, who was of average height and weighed 160 pounds, had diabetes mellitus, and died of paralysis at the age of fifty-five years. Her father was over six feet tall, weighed 220 pounds, and was healthy. There was no family history of any inheritable disease except the diabetes of her mother.

The patient herself had never had any serious illness, and was never excessively stout until twenty-two or twenty-three years of age, when her breasts suddenly grew large and flabby and became very pendulous, so that finally "they were almost disconnected from the body by their own weight." On account of the annoyance they gave her these were removed, about five years ago, by Dr. J. W. Chambers, of this city. The combined weight of the two breasts after removal was nearly twenty-five pounds. (Confirmed by Dr. Chambers.)

After amputation of the breasts, the abdomen, which hitherto had been of normal size, also began to accumulate fat, and finally had become very large, hanging down in folds, especially in front, but also at the sides. (See illustration.)

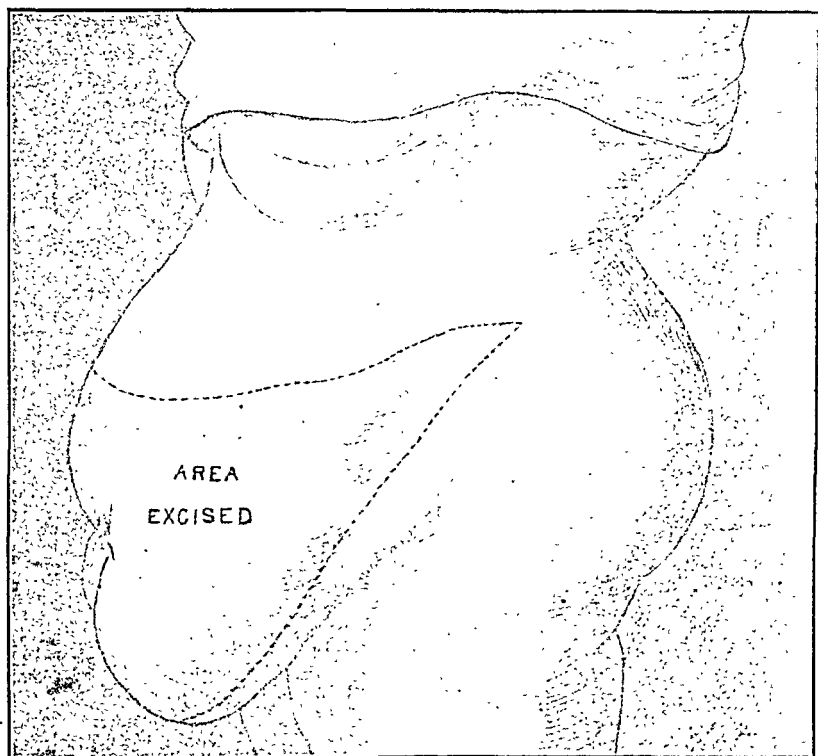
The patient was "not a very hearty eater," but about the time when the adipose tissue in the breasts began to become excessive she acquired great thirst, and ever since then had always drunk a large quantity of water. At times her thirst was almost insatiable.

Her general health was good, although she suffered much from "neuralgic headache" and was constipated. Micturition was apparently perfectly normal, the bladder being emptied five or six times a day, the total daily quantity of urine not being

excessive. There was profuse sweating of the entire scalp, particularly over the occiput.

On physical examination it was noted that the patient was a large, exceedingly obese woman, weighing 285 pounds. The color of her skin and of the mucous membranes of her lips was good. The tongue was not coated. The pulse was somewhat irregular, its force and rate being normal.

The heart-beat had an irregular rhythm, and a soft systolic



Pendulous adipose abdominal wall. The excised area is included between the dotted lines; the scars of the previous amputation of the immense pendulous breasts are shown.

murmur could be heard all over the sternum, but was apparently not transmitted. (The examination of the heart was unsatisfactory on account of the extreme thickness of the chest walls.) The scars of the breast-amputations were seen on the chest, entirely healed. Examination of the lungs was negative.

In the abdomen the panniculus adiposus was enormously increased, and the skin was seen to hang down in a thick fold in

front and at the sides. When the patient stood erect the pendulous fold covered the upper portion of the thighs, and in a sitting posture the lower border of the fold reached to within two centimetres of a line between the knees. The greatest circumference of the abdomen measured 200 centimetres, and this was at a level twelve centimetres above the umbilicus. Beneath the fold of abdominal skin was a long crease affected with eczema intertrigo.

The urine was found to be acid, having a specific gravity of 1023, and to contain sugar in considerable quantity (Fehling's test). Albumen was also present in small amount, but no casts were found by microscopic examination of the sediment.

May 8, 1899, Dr. Kelly excised an enormous crescent of the abdominal skin and subcuticular fat.

Under ether anæsthesia, the patient being in the dorsal posture, a transverse incision was first made thirteen centimetres above the umbilicus, extending across the abdomen from the line of contact with the table on one side to a corresponding point on the opposite side. This incision measured eighty-five centimetres in length, and in depth extended to the muscular layer of the abdominal wall, the layer of fat being about five to six centimetres thick. A downward dissection was then made, separating the fat from the underlying muscle by cutting and blunt dissection with the fingers. In this manner, having turned downward a great slab of abdominal skin, this was lifted up from below, and an estimate made as to how much could be removed without incurring too great tension in closing the wound. A lower transverse incision was then made, about five centimetres above the eczematous crease, beneath the fold of skin, which met the first incision at its ends. The great crescentic mass of skin and fat was thus freed and removed.

In dissecting off the mass about fifteen blood-vessels were tied, several of which were about three millimetres in diameter. The bleeding in the upper incision came mostly from descending vessels, while in the lower incision the vessels cut came from below.

In closing the wound, silkworm gut and catgut were used. The upper and lower edges of the skin were first brought together in the middle with a silkworm-gut suture; other silkworm-gut sutures were placed at intervals of about ten centimetres all

the way across the abdomen; then a series between the first, making the intervals about five centimetres. The approximation was completed with catgut sutures. In all fifty-six sutures were used, twenty-two of these being silkworm gut, twenty-four catgut. The line of union was eighty-five centimetres in length.

Two strips of iodoform gauze were placed in each end of the incision for drainage.

The result after the closure was a smooth abdomen without any hanging folds.

The dressings used were silver foil, sterile gauze, and absorbent cotton. Strips of adhesive plaster retained the dressings and also served to prevent undue tension on the sutures. An additional support for the abdominal walls and protection for the dressings was furnished by a tightly applied eight-tailed abdominal bandage.

The mass of skin and fat removed weighed 7450 grammes; its length was ninety centimetres; its greatest width thirty-one centimetres; its thickness seven centimetres. The umbilicus was situated about at the centre of the mass.

Firm, primary healing of the wound took place all along the line of sutures, and the drain cavities at the extremities of the incision healed by granulation. The discharge from the right drain cavity was purulent after the seventeenth day, and on this account the patient's body was kept immersed in a tub of water for several days, until the cavity became filled with healthy granulations.

The patient was not permitted to sit up for one month after operation.

The highest temperature after operation was 101° F., on the third day, and subsequent to that time it was never above 100°.

For the first twelve days after operation the diet was exclusively liquid, after which a very light, soft diet was given.

Sugar was found in the urine only twice during the convalescence—on the third and twenty-ninth days—probably owing to the diet.

The patient was discharged in good condition thirty-seven days after the operation, her weight having been reduced from 285 pounds to 226 pounds.

A letter from the patient, dated January 5, 1901, states that

she "now can walk very well indeed," her only complaint at present being extreme nervousness.

In the ANNALS OF SURGERY for November, 1900, Dr. J. B. Bullitt, of Louisville, reports a similar case in which, in the course of an operation for the radical cure of umbilical hernia, he resected the redundant skin and subcuticular fat of an excessively adipose abdomen. He closed the wound with silkworm gut and catgut and obtained firm healing per primam.

I wish to thank Dr. Kelly for the privilege of reporting this interesting case.

# EVERSION OF THE TUNICA VAGINALIS AS A REMEDY FOR HYDROCELE.

By DUDLEY TAIT, M.D.,

OF SAN FRANCISCO.

SURGEON TO THE FRENCH HOSPITAL.

HYDROCELE, although a minor surgical affection, has given rise to a host of operations and modes of treatment, but none of the methods at present in vogue are entirely satisfactory or reliable. The diversity of etiologic factors in hydroceles may explain in part the failure of any single method to cure all cases. However, the extreme frequency of this morbid lesion calls for a simple and safe operation of choice.

In the present paper I shall confine myself to the consideration of the so-called radical methods of treatment. The essentials of a radical cure are that it shall be devoid of danger and pain, prevent recurrences, and, finally, that it shall permit the patient to resume his ordinary business in the briefest possible time.

Treatment by the injection of irritating fluids with the purpose of producing adhesive inflammation between the layers of the serosa is described by English and American authors as a radical method, notwithstanding the large proportion of relapses and the numerous and serious complications following its use. Authors still advocate this plan of treatment which substitutes for a benign affection a marked, and occasionally uncontrollable, attack of orchio-epididymitis. It is astounding to what extraordinary, and in many cases inconsistent, limitations the injection method has been carried, and no more conclusive proof is required to show its inefficiency than the interminable list of drugs and other substances which have been employed for this purpose. Nothing more



unsurgical and less in accord with modern expeditious and clean technique could be imagined.

The so-called Volkmann's operation—incision followed by suture of the edges of the serosa to the skin, with or without drainage—is easily and rapidly done under local anæsthesia, but its results are very uncertain. In many instances the wound is still granulating after four and even six weeks. Of eighteen cases which I operated by this method (1892-1898), I traced twelve, and noted a relapse in two cases. Two cases required drainage for a period of four weeks or more. German authorities acknowledge from 12 to 15 per cent. of recurrences after Volkmann's operation. Block's operation is a modification of the foregoing procedure, with an attempt at early closure of the wound. After making a free incision of the tunica vaginalis, a 3 per cent. solution of carbolic acid is applied thoroughly to the entire surface of the serosa. The cavity is then packed with strips of iodoform gauze. These strips are removed on the third day, when the skin is sutured without drainage. Block admits 5 per cent. of recurrences.

Partial excision of the parietal tunica vaginalis has proved useless. Total excision of the serosa, commonly and erroneously accredited to von Bergmann, was resorted to by Celsius, Albucassis, Fallopius, Boyer, Dupuytren, and Bardeleben. The severity of this operation will always militate against its adoption as a procedure of choice in the common forms of hydrocele. In certain sclerosed, calcareous, or tuberculous conditions, total excision may prove of inestimable value.

*Inversion or Eversion of the Tunica Vaginalis.*—The principle of this operation differs absolutely from that of total excision: instead of removing the serosa, it is retained, and turned inside out, thus destroying the secreting serous sac. The secreting surface becomes external, and the secretion is absorbed as it forms. Vautrin, of Nancy, was probably the first to propose this method. Doyen claims to have operated in the same manner as early as 1891. Jaboulay and the school of Lyons perfected the method, which was subsequently adopted by several Paris surgeons (Longuet, Quénu, Legueu).

The operation of inversion of the tunica vaginalis is performed as follows: Under local or general anæsthesia, an incision is made down to the fibroserous layer. The length of the incision varies necessarily with the dimensions and position of the hydrocele. The tumor, still unopened, is then dissected by means of gauze or the finger, until the mass is free from the cellular layer, especially posteriorly. All bleeding must be checked at this stage by hæmostats or ligatures. A long incision is then made in the sac, from which the liquid escapes. The tunica is then turned inside out, placing the endothelial surface outward, and securing the cut edges of the serosa as high as possible around the cord by means of two or three catgut sutures. The testicle is then replaced in its normal position. It is covered by the skin, dartos, and cellular tissue. Suture of the skin without drainage completes the operation, which requires generally from five to ten minutes.

A very mild local reaction, and, exceptionally, some tenderness over the testicle, may be noted during the first two or three days.

At the September meeting of the Academy I described briefly a much simpler mode of inverting the tunica vaginalis; the principle being to cut down directly to the serosa and invert all the layers *en masse*. Such was the plan pursued in a case treated successfully by Dr. Pawlicki and myself. I do not claim, however, the slightest priority for this measure, inasmuch as Longuet published a description of this operation six weeks later (October 31, 1900), and stated having treated twenty-two cases by this plan, the majority as early as 1898.<sup>1</sup>

Longuet's operation consists essentially in the inversion of the cellulo-fibro-vaginal layers, without decortication or hæmostasis; the testicle is transposed. Under local anæsthesia a transverse fold is taken up over the testis and cut with the scissors down to the serosa, which is immediately

<sup>1</sup> The operation proposed by Major Pratt Ims (*Indian Medical Gazette*, August, 1898, and April, 1899) consists of eversion of the tunica vaginalis after delivery of the hydrocele.

taken up and cut in a like manner. Neither the superficial nor the deep cut should exceed 3.5 centimetres.

The testicle is then drawn out, upward and forward, as much as possible, the scrotum being at the same time pulled in the opposite direction by the assistant. The tunica vaginalis and overlying fibrocellular tissues follow and are turned inside out. One or two sutures are taken to secure the vaginalis in its new position; these stitches are placed in such a manner as to avoid injury or strangulation of the cord. Chromic catgut (two weeks) is perhaps preferable to the ordinary gut, which is absorbed too early. The testis is not replaced in its original position, but a new bed is made for it in the middle of the inner lip of the incision by gently dissecting the cellular tissue with the finger. The resulting new cavity is inside of and parallel to the old cavity. The testicle is slightly twisted on its axis, not being in normal anteversion but in retroversion, rotated inward a quarter of a circle and lying directly against the raphé. The position of the testicle may be defined as retro-latero version. The wound is then closed with two or three stitches. The operation is completed within a minute or two; no hæmorrhage is noted, and the immediate effects are barely noticeable, thereby differing radically from all the other methods. There is no local reaction or infiltration of the soft parts, no tenderness, and within a few hours after the operation palpation of the testis does not elicit more than the normal sensitiveness. Consequently, the patient may resume his work on the following day. Nothing simpler, neater, or more expeditious could be imagined. In very large hydroceles, Longuet combines the above procedure with partial excision of the vaginalis, using elastic clamps and a continuous hæmostatic catgut suture on the cut edges of the serosa.

In comparison with the plan of injecting iodine, Longuet's operation possesses many advantages: it is truly a radical measure, simple, devoid of danger, and is not followed by the slightest local reaction.

Total excision of the vaginalis may be indicated in the rare conditions already alluded to, but Longuet's plan has

been successfully used even for cases in which the serosa measured seven and eight millimetres in thickness (hæmatoceles).

In chronic pachyvaginitis with calcareous deposits, even total excision may prove inadequate and castration become necessary.

Longuet's operation will prove serviceable (1) in the majority of the numerous varieties of hydrocele and cysts of the cord, (2) where the surgeon is desirous of exploring the serous sac of the tunica vaginalis, testis, or epididymis, (3) in some cases of hernia complicated with hydrocele, (4) in the presence of numerous cysts.

Unlike total excision, inversion by Longuet's method does not require any special surgical training, and it should prove acceptable to the most pusillanimous patient.

Among the objections made to the method of inverting the tunica vaginalis were the risk of injuring the cord, fixation and subsequent atrophy of the testicle, and the possibility of relapse. All these points have been refuted by experience extending over several years. Thus, Longuet has not found a single instance of recurrence in his list of twenty-two cases.

My personal observations comprise three cases: (1) Patient aged seventy-eight; old standing hydrocele of medium size. Eversion was done under local anæsthesia, without decortication. No hæmorrhage was encountered and no local reaction followed. The patient was comfortable and free from pain as early as twelve hours after the operation. Examination of the patient three months later showed the scrotal tissues freely movable over the surface of the testis. (2) Patient aged thirty years. The diagnosis of hydrocele had been made, but did not seem evident. Exploration showed, in addition to a large hydrocele, a cyst of the epididymis and a smaller cyst of the cord. The cyst of the epididymis was completely enucleated without difficulty; the cyst of the cord was partially excised and drained for two days; the tunica vaginalis was then treated by inversion after decortication. No local reaction was noted, with the exception of a slight infiltration at the site of the drainage. This disappeared within three

days, and the patient ceased to use a suspensory on the fifteenth day. (3) Patient aged fifty-one years. Large, typical hydrocele of long standing. Longuet's operation was performed under local anæsthesia. Exploration revealed marked chronic pachyvaginalitis, especially of the visceral layer. Patient was free from pain ten hours after the operation, and left his bed after forty-eight hours. No local reaction was noted. Six weeks later the testis was found to be freely movable, excepting in a small area anteriorly. Palpation elicited no pain.

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# REPORT OF A CASE OF RECOVERY AFTER ABDOMINAL SECTION FOR MULTIPLE GUNSHOT WOUNDS OF THE ABDOMEN:

PERFORATIONS OF LIVER, GALL-BLADDER, HEPATIC FLEXURE OF COLON, TWO OF THE SMALL INTESTINES, ONE OF RECTUM (DEEP IN PELVIS), WITH ACTIVE AND EXCESSIVE HÆMORRHAGE.<sup>1</sup>

By FRANK MARTIN, M.D.,

OF BALTIMORE, MARYLAND,

ASSOCIATE PROFESSOR OF CLINICAL SURGERY, UNIVERSITY OF MARYLAND.

W. H., aged twenty-four years, residing in West Virginia, was brought to me at the Maryland University Hospital about three o'clock in the afternoon of July 6, 1900, by Dr. W. W. Golden, of Elkins, West Virginia, for the relief of two gunshot wounds of abdomen (.38 calibre) received at seven o'clock the evening before (July 5) at Huttonsville, West Virginia. He was conveyed from where he was shot to Baltimore on a cot in the baggage-car, and I saw him about twenty hours after the shots were received. His physician arrested the bleeding, which was at first very copious, from the wounds of entrance (no wounds of exit existing) by pressure, and covered the wounds with gauze and adhesive plaster,—no probing was resorted to,—and made patient as comfortable as possible by keeping him in the horizontal posture and administering morphia and stimulants hypodermically as needed.

The patient was physically beautifully developed, and had been a very strong, robust man, with a good family and previous history, and bore the shock and discomforts of the trip well. Pulse on reaching here was 120; temperature, 102° F. Examination revealed two gunshot wounds of entrance, one in the

<sup>1</sup> Read before the Medical and Chirurgical Faculty of Maryland, November 20, 1900.

right side, about in the midaxillary line passing in between the tenth and eleventh ribs, the other was in the gluteal region just below the crest of the ilium and posterior to the horizontal line.

The abdomen was very tense and tender to the touch, more so on the right side; there was a marked rigidity of both recti muscles, and, although the entire abdomen was tense, it was not perceptibly distended. There had been no vomiting and no movement from bowels. Urine had been voided several times and was free from blood. A very severe pain was complained of down right side and in right testicle.

On account of the position of the wounds and the tension of the abdomen and pain, it seemed very clear to me that the abdominal viscera were wounded, the extent, of course, no one could say; so I proceeded to open the abdomen as soon as the patient could be made ready, which was at three P.M. of the same afternoon.

Under ether, an incision was made through the right rectus about one and one-half inches from the middle line between the umbilicus and border of ribs. When the peritoneum was opened blood gushed from the abdominal cavity, and, as there was active hæmorrhage from below, I extended my incision quickly from its lower end down towards the pubes, thus giving me an immense opening extending from the border of the ribs nearly to the pubes. By removing handfuls of clot and disembowelling and emptying the pelvis, I was able to locate the bleeding vessel far down in the pelvis and clamp and ligate it. I then found an opening in the rectum which I could not get at to suture, so packed with gauze. This controlled the bleeding from the pelvis, but it was still going on in the upper abdomen. I now directed my attention there and found it was coming from the liver. It was impossible to retract the abdominal wall and thorax sufficiently to get at and control the bleeding, so I very reluctantly cut across the rectus and ran the incision along the costal border sufficiently to aid in having the thorax wall pulled upward and outward, and in that way uncover the liver and enable me to arrest the bleeding. I found the bleeding was coming from a perforation through the entire right lobe, and along with this a perforation of the gall-bladder and one in the hepatic flexure of the colon immediately under it. By forcibly retracting the abdominal wall and the thorax wall at this point, I was enabled with great difficulty to get at the wounds in the gall-bladder and

colon and suture them with several mattress-Lembert sutures of fine silk, and to arrest the hæmorrhage from the liver by packing with a long handkerchief of gauze on the upper surface between the liver and the thorax, and also on the under surface. This packing was left in.

I now carefully but rapidly went over the small intestines, keeping them in gauze wrung out in hot normal salt solution, and replaced them as speedily as possible, and in so doing found two other perforations, which were closed by the mattress-Lembert suture of fine silk.

The soiled peritoneal cavity was now cleansed by washing the intestines outside of the abdomen with normal salt solution and mopping the cavity out in every direction with sterile pledgets of gauze. As quickly as possible the toilet was completed and the abdomen closed. From the great loss of blood, extensive handling of the intestines, and from the prolongation of the operation by my efforts to find all the perforations, the patient was fast becoming more and more shocked, and had it not been for the transfusion which was kept up until the end of the operation (1800 cubic centimetres of normal salt solution being injected), I feel sure the patient would not have lived through the ordeal.

The intestines were so distended and congested in places from a beginning peritonitis that it was with the greatest difficulty that they were kept within the cavity and the abdomen closed. This was accomplished, however, by bringing the abdominal walls together with undue tension, leaving the gauze packing in the pelvis and under and over the liver.

The time of operation was nearly two hours and on the hottest afternoon I ever felt. The thermometer was  $103^{\circ}$  in the operating room.

The patient at the end of operation was considerably shocked, face pale and with a bluish hue, with a pulse ranging about 140. It was a most uncomfortable picture, and the outlook seemed anything but promising. He was put to bed, and freely stimulated through the night with strychnia, grain  $\frac{1}{30}$ , and digitalin, grain  $\frac{1}{100}$ , every four hours.

July 7. Night report from nurse. Patient very restless through the night. Slept from three to five. No vomiting and no nausea; voided small quantity of urine; complained so of



pain in abdomen that  $\frac{1}{6}$  grain of morphia was given hypodermically, and this, by the way, was the only morphia given during convalescence. Morning. Temperature normal,  $98\frac{2}{5}^{\circ}$  F.; pulse, 120; good expression, and expresses himself as feeling moderately comfortable. Abdomen slightly distended.

The oozing into the dressings was so great that the outside dressings were removed and fresh gauze put on. None of the gauze packing disturbed. Milk in small quantities was given every two hours, and calomel, grain  $\frac{1}{6}$ , in broken doses, every half hour, followed by salts. Temperature at six p.m., of July 7,  $102^{\circ}$  F., pulse 130.

July 8. Report. Slept well during early part of night; uncomfortable and restless after midnight. Morning. Temperature  $99^{\circ}$  F., pulse 104. Bowels moved twice at three p.m., with much flatus, and the abdomen became flat. Two grains of calomel in all were given. Patient much more comfortable. The outside dressings were changed on account of the immense oozing, and the dressings over the gauze drains from the liver were bright golden, soaked with bile. I fancy the sutured perforation in the gall-bladder leaked, or the bile came from the perforation in the liver, or both. This flow of bile continued for a week or ten days, gradually lessening, and finally ceased after I had removed all the gauze packing.

The temperature ranged from now on between  $99^{\circ}$ ,  $100^{\circ}$ , and  $101^{\circ}$  F., pulse between 88 and 100, until the eighth day it reached normal, and continued so throughout his recovery. This was due, however, to several stitch abscesses in the abdominal wall resulting from the undue tension which was used in getting the abdomen closed. I was compelled to use interrupted sutures, including all the tissues of the abdominal wall, as distinct from the method I prefer and always make use of, of closing the abdomen by bringing the individual layers of tissue separately together, thus making three rows of sutures. Skin closed by subcutaneous silver-wire sutures. It was with the greatest difficulty that I was able to close it at all, and I was not surprised at finding the stitch abscesses.

July 9. Leucocyte count, 18,000; this gradually fell, and on the eighteenth day following the operation, July 22, they were normal, 7200.

July 11. Doing well, and a more liberal diet ordered. Sleeping well. No vomiting at any time.

July 12. The sixth day after operation most of the gauze packing from liver and pelvis was removed. Three pieces from the liver—length, 6, 2, 14 inches; breadth, 5, 6, 10 inches respectively, opened up and measured after the removal. Two pieces from pelvis—length, 17-23 inches; breadth, 13-12 inches.

July 15. Patient comfortable, and eating all the good things he can secure.

July 17. All the remaining drains were removed and the abdomen almost entirely healed. Pulse ranging from 60 to 70 and temperature running normal. Sat up in less than three weeks after operation, and returned home entirely well just four weeks from the day of operation.

I report this case, first, because it is of interest as illustrating one in which a very wide area was involved in the damage done by the gunshot wounds to the abdominal viscera. The upper, middle, and lower abdomen were involved, and thus called for many repairs, thereby necessarily demanding a somewhat prolonged operation.

Secondly, it is one of interest in view of the great length of time there was between the perforations and the operation, almost a full day, twenty-one hours, and in addition a long railroad journey with hæmorrhage going on within the abdomen all the while, and yet recovery ensued. I take it that it should be classed among the rarer cases of recovery. All observation has shown that the chances of recovery rapidly diminish as the hours go by, and it is generally the case that the patient comparatively seldom survives a laparotomy done a half day or more subsequent to the shooting, as peritonitis is apt to be fully developed and is rarely cut short. This, however, does not argue against operative interference even though late, but rather argues the wisdom of offering help by an operation at the earliest possible moment.

Thirdly, it is of interest from the extent of the opening of the abdomen made necessary by the widely distributed areas of damage. First hæmorrhage, which almost proved fatal, had to be sought for and arrested; this was found in the bottom of the pelvis as well as in the upper quadrant of the

abdomen, and naturally called for an exceptionally large opening. Then, too, the other lesions were found scattered from the top of the abdomen to the bottom, and some would probably have been overlooked but for this, and a fatal issue the result.

Fourthly, it is of interest as showing the immense advantage transfusion of salt solution may play in such cases.

Again. No class of injuries has interested surgeons more of late than gunshot injuries of the abdomen, and in no other class has the fatality been so great, and even now it is exceptionally high; but a few years ago (ten or fifteen), surgeons generally were content to wait upon them, keep them quiet and at rest, administer opium, and watch for peritonitis to develop. In other words, they abstained from operating. The death-rate was so high that radical steps became necessary. To-day, the question is not whether the abdomen should be opened and the injuries repaired surgically,—that has long since been settled in the affirmative,—but the question of moment and importance is,

First, how soon shall we operate?

Again. Shall we wait, and delay the operation because the patient is suffering from shock?

The answer to the former question is, Operate at the soonest possible moment, just so soon as a careful preparation for an aseptic operation can be made. The earlier the better. Each hour of delay counts against the patient.

The latter question must be answered in the negative. The great mortality after gunshot wounds of the abdomen is due to septic peritonitis and hæmorrhage, and the occurrence of these two conditions in producing and continuing the shock; so the sooner operation is undertaken, the sooner the cause for the shock will be removed, and, therefore, the greater will be your chances of saving your patient.

Senn's hydrogen gas for diagnostic purposes is no longer needed. The abdomen is not opened first and the diagnosis made afterwards. It is stated that in perhaps 3 to 5 per cent. of gunshot wounds of the peritoneal cavity the viscera have escaped injury. The probabilities, however, in any given case,

that the intestines or some vessel of moment have been injured, are so great that you should assume it to be the case, and act accordingly. It is known that when the intestines have escaped injury, the direction of the wound was anteroposterior. Where the ball has gone from side to side, intestinal injury is almost positive, and the small intestines are said to be damaged four times as often as the large. Then follow in order of frequency the liver, the stomach, the kidneys.

The surgical reports from the recent wars would indicate that the mortality from the abdominal wounds produced by the new bullet will be but little less in the future than it has been in the past.

The treatment of to-day conceded by most surgeons is entirely surgical, just as is the treatment of perforations of the stomach and intestines from other causes, namely, gastric ulcers, typhoid perforations, appendicitis or what not, is surgical; for, under the expectant treatment, recovery too seldom occurs, and when it does occur, the diagnosis is necessarily doubtful.

When surgical intervention is delayed, the operation is done not only for the repairs of the injured viscera, but for the relief in nearly all cases of septic peritonitis, and the steps in the operation are carried out on the same principles as for septic peritonitis produced by other causes.

PERIOSTEAL OSTEOSARCOMA OF UPPER EXTREMITY OF FEMUR; LIGATION OF COMMON ILIAC ARTERY, WITH AMPUTATION AT HIP-JOINT AND REMOVAL OF PORTION OF PELVIS, ETC.; RECOVERY, WITH FREEDOM FROM RECURRENCE AT END OF NEARLY SIXTEEN MONTHS.<sup>1</sup>

By LEONARD FREEMAN, M.D.,

OF DENVER, COLORADO,

PROFESSOR OF SURGERY, GROSS MEDICAL COLLEGE; SURGEON TO ST. JOSEPH'S, ARAPAHOE COUNTY, AND JEWISH NATIONAL HOSPITALS.

ATTENTION has recently been called to the alarming frequency, and probably rapid increase, of malignant tumors. Czerny, for instance, asserts that 40,000 people die annually in Germany from this source alone; and that at least three times this number are afflicted. The majority of these tumors (75 per cent. according to Coley) are inoperable, either because of their situation, or from want of recognition, or from neglect. Hence the treatment of malignant growths is of great and increasing importance to the medical profession.

Unfortunately, no medicinal treatment has proved of decided value. Much was expected of Coley's injections of the toxins of erysipelas in sarcoma; but, although he has reported some cures, his claims have not been generally substantiated. Other injection methods have been extensively tried and likewise found wanting.

The use of caustics is permissible in a few superficial skin-cancers; but their employment in the great majority of

<sup>1</sup> Read before the Wyoming State Medical Society, October, 1900.

malignant growths is not scientific nor even justifiable. The process is tedious, painful, leaves a large scar, and is, if anything, less effective than excision. And, in addition, we cannot remove with caustics the infected glands and lymphatics which often exist at a distance from the original tumor.

In reality, our main weapon of defence is the knife. We could wish that it were more reliable and less objectionable, but we are forced to accept it as it is. Our aim should be to extend its usefulness to the utmost limit, because patients with advanced sarcomata or carcinomata have little to lose and everything to gain. When they have any chance at all, no matter how small it may be, the surgeon should conscientiously explain the situation, and if the patient chooses to accept that chance, it is the surgeon's duty to operate, even at the risk of damaging reputation or spoiling statistics.

When a curative operation is once determined upon, the main object should be *to remove all dangerous tissue*. The subsequent repair of the part is of secondary importance. If the surgeon has constantly in mind the neat closure of the wound, or the saving of certain structures for cosmetic or other reasons, he is too apt to leave undone that which it is essential to do. Many an operator has cut too close to a cancer because he was afraid of causing too great a deformity. A thorough knowledge of plastic surgery and skin-grafting is essential to effective work.

In judging what can and what cannot be accomplished, we must not rely too implicitly upon the older statistics. Improved technique, together with a better understanding of the manner of dissemination of malignant growths, has given us a confidence and skill which we did not have before. Our methods of combating shock and hæmorrhage have also undergone vast improvements. These facts are well illustrated in the results of operations for carcinoma of the breast. From 10 per cent. to 15 per cent. of cures was formerly considered good work, but the number has been gradually increased until Halsted now claims more than 50 per cent. The range of shoulder amputations has been extended until it comprises both

the scapula and clavicle, and a number of cures have been recorded. In like manner, amputation at the hip-joint may now include the removal of the corresponding half of the pelvis, although up to the present time very few such operations have been attempted.

Whether we go as far as this or not, in amputating at the hip for malignant growths, it is at least a question whether we should not always make an incision above Poupart's ligament, turn up the peritoneum, and clean out from the pelvis all enlarged glands and suspicious tissues, just as we remove the contents of the axilla in the presence of mammary carcinoma. If desirable, the external, or even the common iliac, artery may be tied through such an incision, if it be sufficiently prolonged; and when this is done, the muscles of the thigh and gluteal region can be removed close to their bony attachments, and as much of the pelvis itself sawed away as may be necessary.

It is questionable if this method of procedure increases the gravity of the operation to a very great extent; and even if it did, it would be justifiable in most cases.

In the latter part of July, 1899, I examined an emaciated, anæmic Swedish woman, thirty-eight years of age, referred to me by Dr. Maxwell, of Elizabeth, Colorado. An enormous sarcoma occupied the upper half of the right thigh, and extended well into the pelvis, where large masses could be felt above Poupart's ligament. Much of the skin was involved upon the anterior surface of the thigh, extending well over towards the labium majus and for a short distance onto the abdomen. Posteriorly the skin was free. Over one projecting nodule, the size of an orange, the cuticle was almost broken through. The tissues beneath were semifluctuating.

The growth was first noticed seven months previously, as a swelling the size of a small egg, just below the fold of the groin. Rapid increase in size took place, accompanied by much pain and œdema of the entire limb. The patient lost weight rapidly, and during the last two months had been unable to walk, even with the aid of crutches.

After explaining the fatal nature of the malady if left to

itself, I informed the woman that an extensive hip-joint amputation offered her a small chance of recovery, with a large amount of risk. Between a few weeks of painful and anxious existence and a dangerous operation she at once chose the latter.

Operation at St. Anthony's Hospital, July 31, 1899. Assistants, Drs. C. K. Fleming and J. G. Maxwell. An ample flap, of skin only, was dissected upward from the posterior surface of the thigh and gluteal region. A long incision was then made from within the spine of the pubes irregularly parallel to Poupart's ligament, and well above it, so as to avoid the diseased area of skin, and reaching some distance beyond the anterior superior spinous process of the ilium. The peritoneum was turned upward, without opening the abdominal cavity, so as to freely expose the internal surface of the wing of the pelvis and part of the small pelvis itself. Large nodules of tumor substance were seen bulging upward beneath the artery and vein and the psoas and iliacus muscles. Without undue difficulty, the external iliac artery was first tied, and then the common iliac a short distance above its bifurcation. It was then an easy matter to remove from the area exposed to view the malignant growth, the infected glands, and the remainder of the soft tissues, including the muscles.

The hip-joint was opened, and disarticulation accomplished, from in front; all the muscles, including those of the gluteal region, being severed at their pelvic insertions. The skin incision was carried well up onto the external surface of the labium majus. The loss of blood, with the exception of that remaining in the amputated limb, was comparatively slight.

The bone above the acetabulum being considerably involved, a large portion of the pelvis, from beyond the crest of the ilium to the pubes, was removed with a saw.

By means of chromicized catgut, the abdominal muscles were united to the periosteum of the cut margin of the pelvis, and the posterior skin-flap sewed to the skin of the abdomen and labium majus, drainage being provided for by a button-hole incision. A moderate amount of shock occurred, but was successfully combated by means of stimulation and saline solution injected copiously beneath the breasts during the operation and afterwards.

Recovery was rapid, healing being by primary union, except



a single stitch-abscess. The patient was sitting up within three weeks.

The growth was found to be an enormous sarcoma, springing from the periosteum of the femur upon its anterior surface, at the level of the lesser trochanter. The tissue was very soft, almost mushy in parts, and had undergone fatty degeneration in several places, with here and there an interstitial hæmorrhage.

During December, 1899, the patient came to my office, walking with the aid of crutches. She was perfectly well and quite fleshy. There were no signs of recurrence, local or otherwise. An artificial limb could not be worn on account of the absence of even a semblance of a stump; although the skin, which had originally been smoothly drawn over the remnants of the pelvis, had become thickened by fibrous tissue.

On November 27, 1900, nearly sixteen months after the operation, the woman's husband reported to me that she was in better health and flesh than ever before, without a suspicion of recurrence of the tumor.

# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, November 28, 1900.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

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## RESULTS OF OPERATIONS FOR SEVERE FRACTURES OF SKULL.

DR. ROBERT H. M. DAWBARN presented a man who was sent to the City Hospital from another hospital in New York, October 25, 1900. About three weeks before admission, he fell from the top of a two-story building, striking on his head. In addition to fracturing three ribs and his left collar-bone, he had a wound about six inches long on the left side of the scalp. This was regarded as a scalp-wound in the first hospital where he was taken. Upon his admission to the City Hospital, three weeks later, he had well-marked ataxic aphasia. When asked questions he appeared to understand, but was unable to answer them. When given a pen and asked to write his name, he apparently understood the request, but was unable to write. He had a moderate degree of right facial paralysis, and almost complete right hemiplegia. He was unable to walk without support, on account of weakness of the right leg. The patellar reflex was somewhat exaggerated. The pupillary reaction was normal as to distance, but unaffected by light; and this was true upon both sides. As evidence that this was not caused by a previously acquired tabes dorsalis, we have the curious fact that at present his pupils respond perfectly to light.

An omega-shaped incision was made over the left side of the skull at the site of the injury, and a very large flap of bone broken at its base, just above the ear, and reflected down. A smaller incision was then made through the dura, though one centimetre smaller everywhere, and this at once liberated about

a drachm of pus at the uppermost point, which corresponded with a line of fracture, together with some disintegrated brain tissue. The fracture of the skull was very extensive, but without depression of the outer table. It involved the temporal, parietal, occipital, and frontal bones; and it was found that a number of small spicules of the inner table had penetrated the dura and were lacerating the brain. One of these entered the brain fully one and a half centimetres—the outer table showing only a fissure opposite this point. These pieces were removed, and the pus cavity in the brain was filled up repeatedly with hydrozone (full strength), and then flushed with warm normal salt solution. Some bundles of catgut strands were left in for drainage. The operation was followed by immediate improvement in the man's symptoms. The aphasia and the symptoms of hemiplegia have almost disappeared, although his grasp on the right side is still impaired somewhat.

Dr. Dawbarn also presented a boy who had been sent to the City Hospital from the Harlem Hospital, where he had been operated on October 2, the day on which he had fallen from an elevation of fifteen feet, striking on his face. He sustained a fracture of the frontal bone, and subsequently developed a meningitis, from which he recovered, though it left him with clouded intellect and much frontal headache. Twenty-five days later he was sent to the City Hospital. Upon his admission, the boy was in a semiconscious condition. The pupils were equally dilated and reacted normally to light and accommodation. The eyelids of both eyes were ecchymosed, and the left upper eyelid drooped. He was unable to walk well without assistance. The right eye was, and is still, subject to a moderate external strabismus, never present before his fall, he states.

Upon operation it was found that the lower end of the fracture had involved both frontal sinuses, which were filled with an inflammatory exudate, pus, and granulation tissue. Both were thoroughly scooped out, flushed with hydrozone, drained through the nose, and packed with aristol gauze. Upon widening the lower end of the fissure ascending through the frontal bone, three radiating lines were found, one running straight back and two to the man's right. Opposite the coronal suture a spicule of bone two centimetres long was found penetrating the brain and perforating the superior longitudinal sinus. This was probably

a chief cause of the meningitis which the boy had had soon after the receipt of his injury and of his present symptoms. Upon removing the spicule, the longitudinal sinus bled very sharply. The bleeding was controlled by packing with *non*-absorbent gauze, which Dr. Dawbarn said is preferable to absorbent gauze for this purpose, and had used it for years wherever packing must be used to control hæmorrhage. The latter (absorbent gauze) really *encourages* bleeding by its capillarity, at first; and in some cases the loss of even a small quantity of blood may prove an important factor in the causation of a fatal degree of shock; so that the question is not devoid of importance.

The gauze used in this case was a narrow gauze bandage, one-half inch in width, sterilized by steam, and with its loose threads removed. It was withdrawn during irrigation, after forty-eight hours, with no recurrence of hæmorrhage.

The patient made an uneventful recovery from the operation, which was followed by a rapid improvement in his mental symptoms.

A point in the technique which avoids the necessity, in these fissured cases, of widening the crack from end to end, is to search for depressed pieces (of the vitreous table alone) by use of the flat end of a probe. Enough bone is removed by rongeur, or otherwise, to permit of its introduction along the fissure between dura and skull. A long stretch of fissure may thus be tested readily; and need only be further attacked at the point or points where the probe meets evidence of need for it.

## LARGE TRAUMATIC SUBDURAL HÆMATOMA, WITH TWENTY-ONE DAYS "FREE INTERVAL."

DR. OTTO G. T. KILIANI presented a man who was admitted to the German Hospital, on June 6, 1900, with the following history, which was obtained from his wife. Heavy drinker; no history of lues. On the 5th of the previous month he was struck on the left anterior parietal region of the head by a brick which fell from a height of forty feet. Patient wore a derby hat at the time. No wound. He did not become unconscious, but kept on working after having been a short time in a dazed condition.

On Saturday, May 19, he was perfectly well in every respect, went to work as usual, and neither friends nor family noticed anything wrong. On the next day, his wife observed

that while drinking coffee his hand trembled, and he spilled the coffee on the table. He made several efforts to drink, but did not succeed. May 22 he was seized with a violent frontal headache. May 26, *twenty-one days after injury*, while walking from his bed to the table, he became dizzy and almost fell. This sensation passed away in a few minutes. He became weaker, not being able to walk around as well as usual; had to stop working. June 1, a slight hesitancy of speech began, increasing up to the time of admission; could use only an occasional word. Tried to write a letter, but was unable to form intelligible sentences. The individual letters were out of proportion to each other, poor alignment; could hear, see, smell, and taste well. Since June 1, frequent micturition, slight loss of weight; seemed to be aware of his surroundings before being removed to the hospital, June 6. June 7 was visited by his wife, but did not recognize her, and took no cognizance of other visitors. When received at the hospital he was somewhat somnolent, with flushed face, becoming slightly restless when aroused and addressed in a loud voice. There was slight spastic paresis of right arm and hand, and right leg, though less. Superficial skin reflexes exaggerated, elbow-, knee-, and foot-reflex normal. Sensation to sticking present, sensation to heat and cold slightly reduced. Ataxia in both arms, touches named spots with much tremor. No facial paralysis. Hearing in both ears good. There is a partial motor aphasia; words are brought out with great difficulty, and then not always the correct ones,—paraphasia. There is no word-blindness. He can appreciate what he reads, but cannot express it; the form of sensory aphasia which is most marked is the amnesic one. The ability to express an object correctly in writing is gone, although a few letters could with some imagination be made out,—paragraphia. Power of expression by signs is diminished, but not gone. All mental efforts tire the patient easily, when he becomes helplessly confused. Percussion over the temporal regions with mouth wide open gives for the left side a longer and lower-pitched sound, producing pain there. The examination of the brain symptoms was made by and with Dr. George W. Jacoby. Ophthalmoscopic examination by Dr. Grüning shows nothing abnormal. During entire period no vomiting. Temperature ranging between 98° and 100° F.; pulse, ranging between 60 and 92, mostly 64-68; respiration, between 12 and 24.

June 11, in narcosis, thirty-six days after injury, the left side of the cranium was exposed by a horseshoe incision; height and width of the flap, five inches; anterior diagonal, six and one-quarter inches; posterior, five inches; base, two and one-half inches.

Six small buttons of bone were removed by hand-trephine, the holes connected by Gigli saw, which was inserted by an ordinary probe. Flap broken off at the base. Duration time employed in the opening of the skull, thirty-six minutes. Dura tense, non-pulsating, with unusually large, tensely filled veins, a dark color shining through. Crucial incision of dura, reaching not quite to the edge of the bone, to prevent prolapse of the brain later on. Evacuation of blood-clot (with finger and spoon) one and one-quarter inches thick, covering practically the entire left hemisphere, reaching to the sinus frontalis. After partial evacuation of the clot, pulsation of the brain could be distinctly seen; in a few minutes a perceptible expansion of brain tissue could be noted. Pia and convolutions normal. Partial suture of dura, drainage through two of the holes by means of iodoform gauze. Suture of scalp. While the patient was still on the operating table, the spastic condition of right extremity disappeared. Four hours after operation, he spoke coherently; motions of right arm were perfect, could read well with a little effort. June 13, ability to write has returned. Slight headaches. Amnesia from the time when he first spilled the coffee till the latter date. Did not know where he was until told. Still very slight motor aphasia.

June 15, first dressing, tampons removed, wound healed primarily. June 20, second dressing, small drainage-holes healed. August 19, ten weeks after operation, perfectly well, attends to his business. Since then well, works every day in a sculptor's studio.

The cases of large subdural hæmatoma without fracture of the skull, successfully operated, seem to have been extremely rare. The reporter had been able to find only the following two:

Russell and Pinkerton, *British Medical Journal*, 1895, June 15. A very rare case of intracranial hæmorrhage produced by trauma, without fracture or tearing of the meningeal media. Fall from tricycle. No fracture, no depression. Vomiting, no loss of consciousness,—paraphasia. Partial Paralysis of right arm,

cramps. Operation on tenth day. Hæmatoma over speech and arm centre. Recovery.

Hahn, Ein Beitrag zur Chirurgie des Gehirns; Centralblatt für Chirurgie, 1896, 6; Deutsche medicinische Wochenschrift, 14-16. Subdural, large hæmatoma without fracture. Trephining. Recovery.

The speaker thought the unusually long "free interval" ought to be especially noted.

DR. GEORGE E. BREWER reported a case, presenting same symptoms, similar to the one presented by Dr. Kiliani. The patient was a man who on July 1 was struck on the head by a falling crowbar, which apparently inflicted merely a scalp wound just to the right of the median line. After three weeks he returned to his work, but in two or three days he began to complain of very severe headaches at the site of the injury. These gradually became so severe that he was again compelled to give up his work, and seven weeks after the injury he found himself unable to stand. This was followed by a contraction of the right side of the face. In addition to this there were various symptoms of an indefinite character which persisted for several weeks. He then went to the Vanderbilt Clinic and was examined by a neurologist, who found an intention tremor of one arm and leg and a good deal of ataxia. The tremor was so pronounced that the patient was unable to carry a glass of water to his mouth without spilling almost all of it. His symptoms, especially the persistent localized headache, led to the diagnosis of depressed fracture, with a hæmatoma. There was considerable difference of opinion, however, among the men who observed him, as to whether his symptoms were due to a cortical lesion or something else. An exploratory operation was done by Dr. Weir, with absolutely negative results. Nothing was found, and the man's symptoms have remained about the same since the operation.

DR. DAWBARN said that Dr. Kiliani's case reminded him of one which he reported before the Society some years ago, and which was afterwards published in the *ANNALS OF SURGERY*. The patient received a blow on the right side of the head, and during the following week he became more and more irritable. He then developed a partial left hemiplegia and left facial paralysis. He continually placed his right hand over the right side of his head, to indicate where he had been struck. The case was

looked upon as one of hæmatoma, which had formed gradually. The patient was examined by the late Dr. Landon Carter Gray, who agreed in the diagnosis. Two disks of bone were thereupon removed over the site of the injury, but nothing was found, and the patient died two days later. The autopsy revealed a very large blood-clot over the *left* motor area,—the side paralyzed!—between dura and skull. The brain and medulla were subsequently sent to Dr. Gray, who reported subsequently that it was one of those very rare cases where the motor fibres had not crossed, but had gone straight down, each on its own side of the medulla and cord. In discussing the case at the time, in the Surgical Society, Dr. Joseph D. Bryant said that he had had one similar case in his own experience, and knew of one more.

DR. F. KAMMERER said that he also had had a case similar to the one shown by Dr. Kiliani, in which there had been a long interval between the accident and the rather sudden appearance of symptoms due to hæmorrhage. The patient was a man who fell from a bicycle, receiving a slight scalp wound, which healed in about a week, during which time the patient occasionally suffered from headache. He was unconscious at the time of the accident for some time (variously estimated at one-quarter of an hour and three hours.). At the end of ten days the wound had healed, he felt perfectly well, and resumed his business as usual. He began rather suddenly to complain of headaches six weeks after the accident. Within two weeks, without entering into the details of the case, symptoms had developed which made the diagnosis of a brain abscess probable. Dr. Kammerer trephined the skull and found a large amount of clear, dark fluid and much clotted blood beneath the dura. The blood-clot was about a quarter of an inch in thickness, lying immediately over the brain, and above this was the clear fluid, both separating the cortex of the brain from the skull for a distance of about an inch and one-half. This collection of blood and serous fluid had therefore produced considerable compression of the brain. The compression was relieved, and the man was free from symptoms for a time, but six months later it became necessary to operate again. The patient succumbed to his trouble about a year later. At the first operation there was no evidence of any lesion whatever to the skull from the accident. It was almost impossible to assume that so large a hæmorrhage could have occurred at the time of the in-



jury, and the patient have been able to attend to his every-day duties for the following six weeks, barring the first days after injury.

DR. KILIANI said that in his case there was absolutely no wound nor fracture, and so far as could be made out the meningeal arteries were uninjured. The hæmorrhage seems to have come from the frontal sinus; this was indicated by the size and location of the clot.

#### COMPOUND DEPRESSED FRACTURE OF THE SKULL, WITH INTRACRANIAL HÆMATOMA.

DR. KILIANI presented a little girl who was struck on the top of the head by a soda-water bottle which was thrown from a third-story window. The bottle descended perpendicularly, and punched out a circular flap at the vertex. The child was rendered unconscious, and taken to the hospital, where a fracture of the skull was discovered. Subsequently there was projectile vomiting, and gradually symptoms of brain compression developed, due to profuse hæmorrhage from the longitudinal sinus. The skull was trephined on the eighth day and the compression relieved. The child made an uneventful recovery. She still has a defect in the skull.

#### RESECTION OF THE LOWER JAW FOR SARCOMA.

DR. F. W. MURRAY presented a girl, eleven years of age, who was admitted early in October of the present year to St. Luke's Hospital. Family and personal history negative. Last July a small lump was noticed on the inner side of the jaw opposite the first bicuspid tooth (left). The tumor grew rapidly, and on admission the patient complained of difficulty in eating and speaking; no pain. The mouth was almost filled with a dense semisolid mass, the size of a large egg, and continuous with the inner half of the left lower jaw. The tumor extended from the median line outward to the neck of the condyle, and the lower edge of the body of the jaw was thickened to twice its natural size. Mucous membrane was intact; the mass, soft in spots, gave the impression that the growth might be cystic. Aspiration and X-ray examination negative. Glands in submaxillary region enlarged, hard. Left half of the jaw was resected and glands removed. Convalescence uneventful. Pathological examination

showed the growth to be a myxosarcoma; no round cells, spindle-cells predominating. The result is excellent in that the upper and lower teeth on the right side approximate perfectly, and the child is able to eat solid food with ease. No special attention was given after operation to keeping the right half of the jaw in position. A four-tailed bandage, such as is commonly used in fracture, was applied; the child fed through a tube inserted in the left angle of the mouth.

DR. DAWBARN said that in case of a recurrence, it might be well to try his plan, namely, starving the growth by cutting off its arterial supply. Mere ligation of both of the external carotids will not prove successful, as the circulation returns within a week: they must be excised from end to end, tying off each branch as it is reached. The operation has now been done in between forty and fifty cases, about thirty of which have been by himself, and others by Keen and Da Costa, of Philadelphia, Brewer, Blake, W. Meyer, and Lilienthal, of New York, and Nicolson, of Atlanta. In only three or four instances could death be fairly attributed to the operation. Considering that all these patients are cachectic from malignant disease, the mortality of the operation is surprisingly low. Of course, after doing it on one side, an interval of a fortnight or so should be allowed for recuperation before operating upon the opposite side. It is too serious a measure to make it wise to do both sides at one sitting. The growth promptly shrinks, and remains shrunken, either for a period of months or possibly permanently. Certainly it offers the only ray of hope to a class of patients otherwise entirely in despair.

Dr. Dawbarn had never as yet seen sloughing of the tongue, nose, or other normal tissues follow. It would seem that the normal parts can exist with much less circulation than is needed to permit of the continued growth of a cancer or sarcoma.

#### TUBERCULAR CYSTITIS TREATED BY PERMANENT SUPRAPUBIC DRAINAGE.

DR. F. W. MURRAY presented a man, forty years of age, who was admitted to the New York Hospital in July, 1898. Family history excellent. Personal history good until 1886, when hæmaturia suddenly appeared and lasted for three weeks. The blood was in large amount, sometimes bright red, but more frequently was passed in dark clots, no increase of or pain on

micturition. The blood gradually disappeared, and the patient was quite anæmic for some months afterwards. In 1889, a second attack came on suddenly and lasted for ten days, but was less severe. For the next seven years, *i.e.*, up to 1896, the patient was in good condition, but blood in small quantities appeared at intervals in his urine. In 1896, blood appeared in the urine in considerable quantity, and continued in varying amounts. Frequency of micturition soon began, and became a most annoying symptom; it was accompanied with considerable pain. The bladder had to be emptied every twenty to thirty minutes, and if the patient was moving around he could not hold his water longer than ten minutes. At times vesical tenesmus was intense. The nights were as bad as the days; the pain and frequency of micturition were not diminished, and the patient's sleep was continually broken. As a result of his suffering, he became weak, anæmic, was compelled to give up his work and, owing to the pain, caused by either riding or walking, he spent most of his time in bed. On admission to the hospital, examination revealed enlargement and tenderness in each epididymis, enlarged and tender prostate, inguinal glands enlarged on right side. No attempt was made to examine bladder, as pain rendered it impossible. Urine, acid; specific gravity, 1012; yellowish-red, large amount of blood-stained sediment, which contained many red, white cells, epithelium, some mucus. Tubercle bacilli present. Temperature, 103° F.; pulse, 110. Patient had lost fifty pounds in past two years.

July 16 suprapubic cystotomy was done. The bladder walls were found immensely thickened, especially the posterior portion; the base of the bladder was extensively ulcerated, and at the mouth of the left ureter was found a small papillomatous growth. The capacity of the bladder was about one and one-half ounces. The growth was removed with scissors, the interior of the bladder thoroughly curetted and irrigated with diluted Thiersch solution, a 28 French soft rubber catheter was introduced into the bladder, which was then packed with iodoform gauze to control the excessive bleeding. The following day the packing was removed, and suprapubic drainage, according to Dawbarn's method, was instituted. The postoperative history was that of steady improvement, the patient had good nights, was free from pain, and commenced to gain strength. The urine

lost its red color, but remained turbid, with copious sediment of mucus, pus; this gradually disappeared under daily irrigations. On the twenty-second day after operation he left the hospital, wearing a tube which connected with a rubber bottle strapped to the leg. There was some leakage at first from the wound around the tube, but in a few weeks he was perfectly dry at all times and entirely free from any urinary odor. His condition remained satisfactory until January, 1900, when, owing to the contraction of the wound, he was compelled to wear a tube which was too small for satisfactory drainage. At times water passed by the urethra, and was accompanied with tenesmus, and the urine became ammoniacal. In February he entered St. Luke's Hospital, where the wound was enlarged, the bladder again curetted and several small phosphatic calculi were removed. In order to prevent future contraction of the opening in his bladder a silver catheter, the size of 28 French, was substituted for the rubber one. This caused so much pain that it was removed, and a hard rubber of the same size suitably curved was substituted with perfect success. The patient now wears this hard rubber tube, which is fastened to a hard rubber shield fitting over the site of the wound and fastened by a belt around the body. A soft rubber tube fits snugly over the end of the hard rubber tube and conducts the urine to the rubber urinal fastened to the thigh. This arrangement works most satisfactorily; the patient is perfectly dry, is free from any urinary odor, and is able to attend to his professional duties. The epididymes are smaller and no longer tender, the prostate is smaller, free from pain or pressure, and the enlarged inguinal glands have disappeared. His general health is excellent; he has gained forty-four pounds since July, 1898, and enjoys life. The case is not presented as a cure, but merely to show that at times surgical treatment may be very successful.

The patient previous to coming under the care of the speaker had consulted many of the leading genito-urinary specialists in this city, and they, one and all, advised strongly against operative measures. He had operated not with any idea of getting a good result, but merely to relieve the patient of the constant pain which was wearing him out. The case was one of primary tuberculous cystitis of the bladder, as, from his statements, the vesical symptoms antedated the enlargements of the prostate and epididymis,

and there have been no symptoms of kidney involvement. He did not advocate suprapubic drainage in all cases of tuberculous cystitis, but he took exception to the attitude of many genito-urinary specialists, who condemn any operative interference in these cases, and advise simply change of air, wearing of flannel next to the skin, etc. He added that the patient had taken for several years large doses of creosote, and any benefit which may be ascribed to this remedy began after his operation, as before that time he was steadily growing worse.

DR. CURTIS reported the case of a college boy, with tuberculosis of the bladder, upon whom he performed cystotomy and employed continuous drainage. The sinus closed in six months. The patient returned to the hospital later, and gradually succumbed to tuberculous lesions in other organs of the body about a year later, his bladder symptoms remaining stationary. The operation gave him relief and retarded the local progress of the disease.

DR. WILLY MEYER said that as far as possible he avoided opening the bladder in cases of tuberculosis of the cystitis. In spite of the objections to cystoscopy in such cases, the speaker said he usually resorted to this procedure in order to learn whether the tuberculous process was ascending or descending. One glance at the ureteral openings generally sufficed to clear up this part of the diagnosis. In a case of primary renal tuberculosis a decided improvement can usually be brought about by removing the kidney, even if the other kidney has already become involved in an ascending way. The secondary bladder affection can be advantageously treated by injections of iodoform emulsion, change of climate, etc.

Dr. Meyer said that in a number of his cases of tuberculosis of the uropoëtic system in which he opened the bladder, a permanent fistula remained, and there was continuous leakage. A permanent tube causes much pain and discomfort.

DR. L. BOLTON BANGS said that his experience in this field of surgery had led him to decide not to open a tuberculous bladder, whether the disease was ascending or descending, unless he was compelled to do so for some positive reason. He has been led to believe that tuberculosis of the genito-urinary tract, like tuberculosis elsewhere in the body, is best treated on general hygienic principles. The more conservative methods of treat-

ment are the best. Of course, certain conditions imperatively demand surgical interference. If there is a suppurating kidney, it should be removed; if the testis is suppurating and painful and cannot be relieved by simple measures, it should be taken out, but not on account of the presence of simple foci. In cases of tuberculous cystitis where the cystoscope reveals a distinct ulcer,—not the diffuse redness often seen in these cases,—the application of sixty grains to the ounce solution of silver nitrate is an excellent procedure. This can be done with the aid of a local anæsthetic or under the influence of nitrous oxide gas, and can be followed by a hypodermic of morphine, if the irritation is extreme.

DR. F. TILDEN BROWN called attention to the fact that in Dr. Murray's case the hæmaturia had existed for ten years before the onset of the other symptoms which so clearly coincided with the presence of tubercle bacilli, and when the bladder was opened for the first time in 1898, besides the other lesions a papillomatous tumor was found and removed. The speaker said that while the diagnosis of tuberculous cystitis was no doubt correct, he was inclined to question whether the papilloma had not antedated the tuberculosis, and if its removal had not had much to do with the benefit which accrued from the suprapubic operation and the curettage.

Dr. Brown said that no one fixed line of treatment could be laid down in tuberculosis, whether the disease involves the kidneys or bladder or any other part of the body. He had met with more disappointments in cases intrusted to climatic influences than in those surgically handled. Dr. Murray's patient had doubtlessly been decidedly benefited by the method of treatment pursued.

## FRACTURE OF THE WRIST.

DR. ROYAL WHITMAN presented a boy with a fracture of the lower extremity of the radius, the line of fracture being at the epiphyseal junction, and limiting the dorsal flexion of the hand. The accident had occurred five weeks ago.

Dr. Whitman said he intended to open the joint, chisel loose the lower fragment, to replace it, if possible, in normal position.

## PROPHYLAXIS AND TREATMENT OF ANURIA FOLLOWING OPERATION.

DR. F. TILDEN BROWN read a paper with the above title, for which see page 225.

DR. DAWBARN called attention to the posture recommended by Dr. A. G. Gerster in operations on the kidney, namely, that the patient should lie upon the *affected* side (not, as is usual, upon the sound side) in the lateral prone position, with a hard-rolled blanket beneath, so placed as to direct pressure backward against the kidney to be removed. This crowds the kidney towards the wound, while the flow of blood is in the opposite direction, thus keeping the field of operation dry. In the ordinary position there is considerable pressure upon the sound kidney, as stated by Dr. Brown, which is surely objectionable.

DR. MEYER said the danger of general anæsthesia in operations on the kidney was no doubt a very great one, especially in cases where both kidneys were involved. The future will show whether spinal anæsthesia will prove to be less dangerous.

As regards posture, Dr. Meyer said the one mentioned by Dr. Dawbarn was a very good one. Dr. Lange employs a somewhat similar posture,—the patient lying on the abdomen in such a way that the diseased kidney is forced towards the lumbar incision. The primary lumbar longitudinal incision—the one he always makes first—can be followed by an additional one parallel to the twelfth rib, if necessary. The ureter should be tied and divided first.

Dr. Meyer expressed the opinion that in some cases of anuria following nephrectomy the suppression is due to a congestion or active hyperæmia of the remaining kidney. An increased quantity of blood is carried there by the renal artery, and this must correspondingly increase the pressure in the glomeruli. When the kidney is in such a state of congestion, urine cannot be secreted. In such a case continued hot rectal irrigations may be tried first, besides all the other well-known means furnished by internal medicine. That method failing, active surgical interference should be resorted to. We should cut down upon such a kidney, relieve it of its fibrous capsule, puncture it, and multiply, if necessary. In a case of absolute anuria following nephrectomy, about ten days after this operation, which came under the

speaker's care, he cut down upon the remaining kidney thirty-six hours after the onset of the anuria. Needle punctures were followed by a forcible spurt of blood, and the ureter was found to be blocked by the *débris* of an abscess of one of the pyramids which had perforated into it. The obstruction of the ureter was relieved, the patient recovered, and is alive and well to-day.

DR. HOWARD LILIENTHAL said that in the case reported by Dr. Brown the patient probably succumbed to a weak heart. In all these cases, as soon as there are any indications of anuria, efforts should be made to cause elimination by other organs. For this purpose, the hot-air bath is valuable, and calomel to work on the bowels. By these means the patient may be carried along while the kidney is recuperating, or until the heart is strong enough to induce proper renal action. In some instances, where the heart is strong enough to bear it, pilocarpine may be given to produce rapid and free diaphoresis. Dr. Lilienthal said that personally he had come to the conclusion that intravenous saline infusions—especially large quantities of water—were not beneficial in these cases, as the kidneys often showed an œdematous condition in post-mortem examinations after this form of treatment.

DR. CHARLES N. DOWD said he recently removed a right cystic kidney, the pelvis of which contained 850 cubic centimetres of fluid, of a specific gravity of 1002, which contained a large amount of albumen: it was practically serum. Previous to the operation the patient was passing about thirty ounces of urine a day, with a specific gravity of 1026, free from albumen and casts. The operation was not difficult, the loss of blood was slight, and there was no shock. The patient was sent to bed with a good pulse, and all the indications pointed to a rapid recovery. During the next twelve hours she passed about two ounces of urine, and the same quantity during the following twelve hours. This urine was filled with albumen, and contained blood and granular and hyaline casts. During the third twelve hours less than two ounces of urine were passed, then the quantity gradually increased to eight ounces, and on the fourth day a large amount was passed. The patient, however, was in a distinctly uræmic condition, and this caused her death on the fifth day after the operation. Her temperature never exceeded 100° F. until just before her death, and her pulse was 80 or 90 until the last twelve hours. Towards the end there was cyanosis and muscular twitching. The treat-



ment was directed towards the uræmic condition, and consisted mainly in procuring the best possible secretive action from the skin, producing intestinal activity, and supporting the patient's strength.

Dr. Dowd said that it is difficult to understand why the removal of a kidney which was not secreting urine should have so profound an effect on the other kidney; although in animal experiments the removal of a sound kidney produces much congestion in the remaining organ.

DR. CURTIS said he had resorted to incision of the capsule in two cases of anuria; in one case (after an abdominal hysterectomy) the operation was done under chloroform and the pelves of the kidneys were also opened; in the other under local anæsthesia. In neither case did the incision of the capsule give any relief to the symptoms, although it is possible that the operations were delayed too long. In a third case which came under his observation, an abdominal hysterectomy was followed by almost complete anuria, accompanied by a very hard pulse and beginning symptoms of uræmia. About sixteen ounces of blood were removed from one of the veins of the arm, and an intravenous saline infusion was given immediately afterwards. The patient was at once relieved, and was convalescent in twenty-four hours. The urine in that case was loaded with albumen and much reduced in amount, although previous to the operation there were no definite signs of nephritis.

DR. BROWN, in closing, said he was now inclined to believe that death in the case he reported was due to heart failure, and that the failure of the kidney to act was secondary to this. The idea of splitting the capsule was considered, but the patient's condition contraindicated further operative measures. All other available methods of starting the kidneys to act, and causing elimination by other means, were made use of.

# TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY.

*Stated Meeting, November 2, 1900.*

The President, CHRISTIAN FENDER, M.D., in the Chair.

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## TRAUMATIC ANEURISMAL VARIX OF THE SKULL FOLLOWING A FRACTURE OF THE BASE (EXOPHTHALMUS PULSANS.)

DR. WILLIAM E. MORGAN presented a man whose head, April 23, 1900, was caught between two cars while he was attempting to couple them, the bumpers of the cars catching him, one bumper in front and on the right, temporo-frontal ridge, the other bumper behind and to the left and below the occiput. He was brought to the hospital unconscious, bleeding from the right ear profusely and from the vault of the pharynx, the nose and mouth, and the next day he vomited some blood unconsciously. He remained unconscious for twenty-four hours, with no signs of paralysis that could be detected during that time. Then he began to show signs of pain, but there was no intelligent consciousness. Patient moaned with pain. At the end of three days he had recovered intelligence perfectly, and no signs of paralysis were found anywhere. There were no deviations of the pupils from the normal; both reacted to light equally and evenly; there was no exophthalmus. There was some ecchymosis of the tissues about the right orbit. Patient, however, complained of severe pain and of humming sounds in the right side of the head, the pain radiating from the neighborhood of the right ear up to the vault of the skull, over the forehead, and back to the occiput, never across the middle line. At first, he was perfectly deaf in the left ear; but this deafness at the end of three or four weeks practically disappeared, and it was noticed that hearing in the right ear was much impaired. The pain was so intense that the patient was given large doses of morphine

and an ice-bag applied to afford rest. For a period of three weeks, when rising in bed, patient noticed a little alleviation of the pain, and was therefore allowed to sit up in bed. A day or two later he ventured farther and began to stand up, and a little later to walk about on the floor. After walking about for two or three days, and thus getting some relief from pain, one morning, when he awoke, the eyeball began to bulge, and he complained of roaring noises in the head in the neighborhood of the right ear. The pain was very intense. An examination was made at once of the eyeball with the ophthalmoscope, and nothing wrong was found within the eye. Exophthalmus, in the course of three or four days, became so marked and chemosis so great, that the conjunctivæ of both the upper and lower lids rolled out completely, and it was impossible to open the eye without the greatest pressure. Patient now saw double with that eye, and the motile power of the eyeball was almost entirely lost. It was a week, after the exophthalmus appeared, before any thrill, bruit, or pulsation could be appreciated, indicating the cause of the trouble behind the eyeball. At that time, however, all these signs became plainly manifest. Patient was immediately put to bed, ice-bags applied, with cold applications to the eyelids, etc. Knowing that gelatin injections had given at least a moderate amount of encouragement in treating injured or diseased blood-vessels in other parts, it was thought well, before resorting to ligation of the carotids, to try the gelatin injections. Three days after the first gelatin injection was given, the pain almost entirely disappeared; the bruit became lessened, as did also the exophthalmus. Since then patient has had altogether eight injections at periods of about three weeks, and with each injection he has made visible improvement. He is now free from pain; the exophthalmus has been reduced two-thirds; his sight is returning, and he feels like a different man. The speaker would not say that the gelatin injections were going to cure the patient, but so long as these injections give encouragement he should be rather inclined to use them than to resort to the very radical operation of tying the carotids. Each gelatin injection was followed by an acute renal hyperæmia, which lasted for from four to ten days before relief. Following each injection, the urine and urea became limited. Patient had blood and blood-casts in the urine, and considerable pain in the back and loins. Each injection (subcutaneously given) consisted of 200 cubic centimetres

of a 2 per cent. solution of gelatin, sterilized fractionally, three times at twenty-four-hour intervals. The bruit and thrill are most strongly noted at a point just above the right nasal root. The pulsating tumor is felt plainly, about the size of a white bean, at the upper inner angle of the orbit just under the overhanging supra-orbital ridge.

DR. ARTHUR D. BEVAN said he had had a somewhat similar, though not exactly parallel, experience following a case of gunshot wound, the bullet having entered the body of the superior maxillary bone on the right side. The patient was unconscious for two or three days. There developed in the neck a mass which the interne at the hospital regarded as a retropharyngeal abscess. The interne telephoned him that the patient had quinsy and asked permission to lance it. The possibility of traumatic aneurism having occurred to Dr. Bevan, he telephoned the interne "No," and said that he should like to see the case. He therefore hurried to the hospital, found an aneurismal bruit, and over that side of the neck, deep, with the use of the stethoscope, a thrill could be felt with the fingers. Patient complained of great pain and of roaring in the ears. After making a diagnosis with the aid of the stethoscope, he ligated at once the common carotid, and pulsation and bruit disappeared immediately. The symptoms due to the traumatic aneurism cleared up. Contrary to his direction, the patient was out of bed on the third day after the ligation of the carotid, and made a very rapid and normal recovery. This case was cited because, from his rather limited experience with ligation of the carotid, he did not regard it as a very formidable operation, if aseptically done, and in healthy blood-vessels. He would question in such a case as Dr. Morgan's the propriety of hesitating to ligate the common carotid. The statistics of ligation of the common carotid, upon which very often surgeons based their decision, were largely those of preantiseptic days. Unless there was an anomaly or diseased blood-vessels, ligation of the common carotid was a comparatively safe operative procedure, and he was inclined to believe that in a case of this kind, at this stage, it would be a proper method of procedure.

DR. CHRISTIAN FENGER asked Dr. Bevan what branch of the carotid was involved by the traumatic aneurism in his case, to which Dr. Bevan replied, probably a branch of the internal carotid, although it may have been one of the branches of the external

carotid. It was impossible to determine. The mass was visible inside of the neck, and occluded the pharynx high up, there being powerful pulsation and bruit.

DR. FENGER (resuming) cited a parallel case to that mentioned by Dr. Bevan, a report he had published twenty years ago in Gaillard's *Medical Journal*. A patient of Dr. E. W. Lee was wounded in the face with a revolver-bullet, but there was no wound of exit. The wound of entrance healed by first intention, shortly after which a swelling developed in the region of the tonsil and soft palate. The patient presented at the office of Dr. Lee; the swelling, a traumatic aneurism, was opened, and the patient bled to death in a few minutes. The bullet was found lying between the internal and external carotid with a traumatic aneurism, from an opening in the internal carotid, surrounding it.

As to the case of Dr. Morgan, he fully agreed with him in using gelatin injections. He regarded ligation of the common carotid in an adult with a good deal of apprehension, and did not think the prognosis was much better in these days of asepsis than it was in time of non-asepsis. It was not sepsis which surgeons regarded as of the greatest consequence, but brain symptoms from anæmia and necrosis in the territory of the brain supplied by the internal carotid. The prognosis, therefore, of ligation of the common carotid in the class of cases under discussion was in his opinion grave and uncertain. Zimmermann estimated the mortality, from seventy cases of ligation of the common carotid performed during the period of antisepsis, to be 31 per cent.; thus about one-third of the patients died.

## POSTOPERATIVE ANURIA FOLLOWING NEPHROTOMY.

DR. DANIEL N. EISENDRATH presented a man, fifty years of age, who was referred to him by Dr. Stowell in the month of May last on account of vesical calculus, prostatic hypertrophy, and cystitis. He did a suprapubic cystotomy, but the wound failed to close for some time, and at the end of six weeks it was found, on inspecting the bladder, that the non-closure of the wound was due to an enlarged prostate. He then performed a Bottini operation, which was successful, and the suprapubic wound closed. Examination of the urine once before the suprapubic cystotomy was done, and a number of times after it, showed that there were no

hyaline, granular, or renal casts in the urine. There were, however, many pus-corpuscles, and a moderate amount of albumen. About the end of June, six weeks after the suprapubic cystotomy was performed, patient manifested symptoms of renal calculus in the left kidney. The speaker cut down upon this kidney, and found, much to his dismay, upon examination that the kidney was small and contracted, and evidently had been contracted from chronic parenchymatous nephritis. He apprehended that uræmia would follow the operation, and in fact the patient had suppression of urine twenty-four hours following the operation. The chief reason for showing the patient was to illustrate the possibility in some cases of successfully combating a threatening uræmia following nephrotomy. He gave a pint of normal salt solution the first twenty-four hours (every four hours) under each breast, as well as a pint of the salt solution per rectum every few hours. He gave diuretin, ten grains, every six hours, with salt solution from the second to fourth day. Patient had complete coma, twitching of the muscles, hiccough, and marked suppression of urine for two days. This treatment brought about a hopeful condition, in that the secretion of urine became much more active.

## THE VALUE OF THE X-RAY IN THE DIAGNOSIS OF RENAL CALCULI.

DR. ARTHUR D. BEVAN read a paper with this title, for which see page 239.

DR. JOSEPH EASTMAN, of Indianapolis (by invitation), said he had hoped for some time that the different shadows produced by the X-ray would enable surgeons to distinguish the different structures according to their density.

He narrated a case with a view to raising the question of the relation of prolapsed, or displaced, kidneys to the formation of renal calculi. Some ten years ago he opened an abdomen for the purpose of removing a small ovarian cyst on the right side, and discovered a prolapsed kidney, the lower end of the kidney reaching as far down as the iliopectineal line. He made a careful examination of the kidney, had it between his fingers, plunged a needle into it, and discovered nothing. The pain, which was located in the kidney, had only been of six months' duration, and had only occurred after a long siege of typhoid fever, during which patient had lost fifty pounds in weight. He was inclined

to believe that the kidney became displaced following the loss of fat which to some degree had supported it. Four years later patient presented with an enlargement in the region of the kidney. The pain had now become very intense, and he made another abdominal section with a view to dealing with the kidney. At the section he found a specimen which resembled very much an old shoe. This was exhibited. He was confident that no large stone existed in the kidney at the time he examined it years previously, but that the kidney had become displaced during the four years, and upon abdominal section he found a number of stones in the kidney, which in composition were oxalate of lime.

DR. M. L. HARRIS said that the essayist, in speaking of the etiology, had made use of the classic subdivision of kidney stones into "primary" and "secondary," the former being considered of non-bacteria and the latter of bacterial origin. As it is quite probable that all kidney stones are of bacterial origin, he would restrict the terms "primary" and "secondary" to the state of the kidney. In the former condition the kidney is free from active bacterial invasion, while in the latter it is the seat of bacterial invasion. Surgeons must all recognize the great value of the X-ray in the diagnosis of kidney stones. Remarkable improvements, which have been made in the past year in the technique, were such that the X-ray could now be looked upon as an almost positive diagnostic means in renal calculus. Still, exploratory incisions must be made, and there was a great difference in them. He had seen good surgeons cut down upon the kidney, put their fingers through the small opening, palpate the kidney, and say that it was normal. Such a conclusion was absolutely unjustifiable, and this was the reason why so many mistakes have been made in exploratory incisions. It was frequently impossible to detect a calculus in the pelvis of the kidney by palpation. A kidney that was giving sufficient trouble to warrant a surgeon in cutting down upon it, also warranted thorough exploration both within and without, and if by external palpation nothing was discovered, it should be opened freely, and its interior carefully examined with the eye as well as with the finger, and he considered no exploratory incision complete unless the kidney had been opened to permit of such examination. As both kidneys were affected with stone in about one case in six, it was very important to examine into the condition of each kidney separately in all cases in which calculus is

detected or suspected. As to the method of incision through the body wall, he understood the essayist to say that the danger of hernia in this region was practically *nil*. He did not agree with him fully because hernia occasionally follows incisions in this region, after the manner of the essayist, for operations upon the kidney. Where it was possible, and it is possible in a large percentage of the cases of kidney surgery, it was better to make a muscle-splitting incision. This incision should begin a little in front of the tip of the twelfth rib, and should follow the line of the fibres of the external oblique. It may be carried downward as far as necessary. The fibres of the external oblique should be separated bluntly and drawn aside by retractors. The fibres of the internal oblique, which cross the external oblique almost at right angles, should be separated in a similar manner. The fascia is then cut through and the kidney exposed. The kidney may be delivered through this incision onto the surface if found desirable. This incision practically closes itself upon the removal of the retractor, and the danger of hernia is greatly diminished.

He would emphasize the necessity of always investigating the condition of the ureter. Much of the success of operations upon the kidney depended upon a patent ureter, and he had seen failures result from non-attention to this organ. Some cases do not recover owing to the fact that some obstruction existed in the ureter. In one case which he recalled, in which a large stone had been removed from the kidney, a urinary fistula persisted, discharging urine and pus, and necessitating a secondary operation, when the ureter was found blocked by a stone lodged near the pelvic brim.

In all cases of stone in the kidney, secondary changes, such as sepsis with dilatation or pouching of the pelvis, sooner or later take place. Inflammation may extend through the wall of the pelvis, and in the connective-tissue adhesions which form may flex or constrict the ureter, and thus prevent the free escape of urine from the pelvis, as he saw in one case in which the ureter was flexed and bound by inflammatory adhesions to the wall of the pelvis. Such obstructions must always be carefully sought and overcome, so as to provide a free escape of urine from the pelvis, if surgeons expect such kidneys to recover.

In regard to cutting into the pelvis of the kidney: If the kidney was aseptic, an incision in this location would heal readily and without the formation of a fistula. If, however, the pelvis



was septic or a chronic suppurative pyelitis was present, it was better to cut through the kidney substance than through the pelvis. The probability of a fistula remaining, however, depended more upon the question of an obstruction to the free escape of the urine than upon the simple fact of sepsis, because he had opened the pelvis of the kidney when suppuration was present, relieving the obstruction at the same time, and obtained primary union.

He agreed fully with the essayist as to the necessity of exposing the kidney freely in order to examine it thoroughly.

The surgeon is unable to determine the presence of obstructions in the ureter, the state of the pelvis, or of the exit of the ureter therefrom, unless the kidney was fully exposed.

DR. ALEXANDER H. FERGUSON reported a case showing the value of the X-ray as an accurate means of diagnosis. A woman, from Nebraska, had been operated on for stone in the kidney twice previously, and stones were removed on both occasions by an excellent surgeon. A sinus persisted. Four months after the last operation she presented herself, and upon using a probe through the fistula he encountered a stone. He resorted to local cocaineization, made the sinus large enough to pass a pair of forceps, and removed two stones. All of the urine from that kidney came out through the fistula. A week later the patient was taken to the laboratory of Mr. Fuchs, who took a skiagraph, which showed a small stone in the upper end of the kidney and two stones in the ureter. The stones in the ureter were easily reached and removed by operation, but difficulty was encountered in finding the small stone in the upper end of the kidney. Fifteen minutes were spent with a needle trying to find the stone. Accurate measurements were taken, and it was by this means that the stone in the upper end of the kidney was accurately located and removed.

Two other cases of stone in the kidney were not of sufficient importance to report, in his opinion, because there was nothing unusual about them. The diagnosis could have been made without the X-ray and the stones removed.

He thought too much stress had been laid on extensive incisions into kidney tissue. When the kidney was split from one end to the other, there was great danger of necrosis. Too much emphasis was put upon pulling out the kidney through the wound. A number of cases had been reported where death had occurred from rupture of the renal vessels. However, with that in mind,

the speaker agreed with the essayist that in the majority of cases the kidney can be dislodged and examined.

The incision of Harris was the best one,—splitting in the direction of muscular tissue, and in this way sufficient room could be had to do thorough operative work on the kidney.

### LARGE VESICAL CALCULUS.

DR. E. J. MELLISH exhibited a vesical stone which he had removed from a patient in August. It was exhibited on account of its size. It was somewhat triangular in shape and flattened. In its largest circumference it measured six and a half inches; in its smallest four and seven-eighths inches and the intermediate circumference was six inches. Its weight was 1222 grains (about 7.88 grammes). It was composed largely of uric acid. On bisecting it, the concentric formation was well shown, and its nucleus recognized as a triangular piece left in the bladder at the time of the former operation. Patient had been subjected to lithotrity five years previously with only partial relief. He had then suffered from symptoms of calculus about three years. He removed the calculus through a suprapubic incision, having used a rectal bag and inflated the bladder moderately with air. He sutured the bladder wall, as the mucous membrane of the bladder did not seem to be seriously affected. The catheter was kept in place three or four days, then removed. After this the patient was catheterized every two hours at first; but through an oversight of the interne, twelve ounces of urine were allowed to accumulate, and within a week after the operation extravasation occurred, an abscess formed, and was evacuated through the former drainage opening which had healed. This delayed the recovery perhaps a month. Patient was now well.

DR. CHRISTIAN FENGER considered the X-ray a valuable aid in the diagnosis of renal calculi, and he thought the position taken by the essayist was a step in advance.

As to the incision down to the kidney, he would cut the muscles of the lumbar region transversely as little as possible. Isolation and examination of and operating upon the kidney were comparatively easy if the kidney was movable. If it was not movable, but was located high up, the operation was not easy; and it might become necessary to resect a rib or ribs in order to get access to the kidney and remove the calculi. He agreed with Dr.

Bevan and Dr. Harris that he would rather remove a stone or stones through the pelvis than through the kidney tissue, if he could feel the stone through the pelvis.

He did not think Dr. Harris was right in laying stress on renal inflammation as a cause of permanency of a fistula into the renal pelvis. It is the permeability of the ureter upon which the final result alone depends, as it insures closure of the wound in the pelvis. But the stone or stones will be found by resorting to bisection of the kidney, whilst they might not be found by exploring through an opening in the pelvis. When the lumen of the pelvis of the kidney was too small to permit the introduction of the index-finger, it was difficult or impossible to find the stone by pelveotomy. It was also in a kidney with a non-dilated pelvis difficult to make bisection of the kidney to find the way from the convex surverx to the pelvis, because this incision could not be done along an aspirator needle. When the X-ray showed the existence of stones in the kidney, the surgeon might be obliged to resort to complete bisection of the kidney in order to find the stone.

He spoke of two cases in which the kidney became gangrenous following total or partial bisection of the organ.

DR. BEVAN, in closing the discussion, stated that exploration of the ureter might be omitted in an aseptic case when, from a clear X-ray picture, we feel confident all stones had been removed.

In regard to the question of Dr. Eastman, there was no doubt but that a displaced kidney would favor secondary stone formation, but whether it would be the cause of primary stone formation, he could not say.

As to the danger of necrosis of kidney tissue following a large incision, he had never before heard of such a case, although Dr. Fenger had mentioned two such cases.

He had been very much interested in the statement made by Dr. Fenger in regard to incision in the kidney substance. Only a week ago he made an exploration of a kidney which proved to be almost normal, tried to find the pelvis through a small incision, and expressed doubt as to whether he had accomplished it or not.

## EDITORIAL ARTICLE.

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### CRITICAL SUGGESTIONS ON CLEANSING THE SURGEON'S HANDS.

At the present time there is a wave of hopelessness passing over the surgical world as to the possibility of effective cleansing of the human hand. Many surgeons have devised methods of hand sterilization which seemed successful, but the laboratory worker has always found some defect negating the scientific accuracy of the process. The basis of every method is, of course, the removal of the natural skin grease, and with it the dirt, by means of scrubbing and solvents. (Hot water, soft alkaline soap, alcohol, etc.) This is followed by the application of chemical disinfectants. Examination of scrapings from the skin and from under the nails of freshly cleaned hands failed to give cultures; sterile silk threads pulled through between the firmly closed finger and thumb remained sterile. Clean hands seemed to have been attained. The laboratory worker, however, found that, in spite of lavage in plain sterile water, sufficient antiseptic material was left in the skin to inhibit bacterial growth; when the antiseptic was neutralized by some sterile chemical agent cultures could be obtained from scrapings. If a surgeon, cleaned by any of the standard methods, worked for a few minutes under aseptic conditions and then pulled a sterile thread through between his finger and thumb (as is often done in tying a ligature), the thread became contaminated. It was found that if the so-called clean hand was put inside a sterile rubber bag and allowed to sweat, the exuded sweat was infected. Examination of the structure of the skin with its sweat-glands, hair-follicles, etc.,

shows that absolute scientific sterilization is an impossibility with the means at our disposal. Hence the wave of hopelessness.

Recently current surgical literature has been loaded with articles descriptive of the advantages to be obtained by using various devices for overcoming hand dirt. Firstly, surgeons, who use the dry method of operating, began to wear gloves of cotton or silk thread. A succession of such gloves would be worn during one operation. Undoubtedly, as long as the hands and gloves are *dry*, protection is afforded. This is proven by experiment. Even in the dry method of operating, the gloves and hands become moist from blood and sweat and the protection is lost. (Dr. Barow Kuster, *Archiv für klin. Chir.*, lxii, 339.) Very thin pliable rubber gloves have been highly praised by many eminent men. The gloves are easily sterilized and are impermeable to moisture and filth. Before donning the gloves, the surgeon cleans himself as if he was to wear no protectors.

Given no great inconvenience from the gloves interfering with the sense of touch, by their interposition, and by their constant pressure on the fingers, given no accident, then the use of gloves is admirable. The hands encased in waterproof material are practically being poulticed; they sweat freely; their epithelial covering becomes sodden; the bacteria always present in the deeper layers of the skin are set free, and the gloves now contain a collection of sweat, epithelium, and bacteria. Accidents are liable to happen. The gloves may be punctured by a needle or spicula of bone, or they may split and much of the collected filth escape into the wound. As long as the gloves remain intact, they protect the patient perfectly from hand contamination; as soon as they are punctured, they are sources of great danger.

To take the place of rubber gloves various elastic varnishes have been applied to the hands. Several receipts for such varnishes are to be found in recent numbers of the *Centralblatt für Chirurgie*. The advantage to be gained by using an impermeable varnish instead of rubber gloves is problematical. The same disadvantages belong to both.

Is it necessary to have recourse to gloves? Is it necessary to attain scientific sterilization of the hands? The writer believes that no effort to cleanse the hands should be relaxed, but he also believes that scientifically clean hands are impossibilities and are unnecessary.

If the hands are cleaned conscientiously by any of the standard methods, if they are then well soaked in sublimate solution, even if the excess of sublimate is rinsed off in sterile water, a sufficiency of the antiseptic remains in the skin to inhibit the growth of bacteria, but insufficient to do the patient any harm. If the surgeon, during the course of a long operation, rinses his hands several times in an antiseptic solution and then in sterile water, he removes or inhibits the activity of any bacteria which may have come to the surface of the skin. As an extra precaution, applicable to many operations, it is wise to follow the lead of König and avoid touching the wound with the hands. König has trained himself and his assistants so thoroughly in the use of forceps, retractors, and the eyes, that he excises the knee-joint in the most thorough manner without any fingering of the wound.

JOHN FAIRBAIRN BINNIE.

# INDEX TO SURGICAL PROGRESS.

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## GENERAL SURGERY.

**I. A Contribution to Iodoform Poisoning.** By DR. WILLY ANSHÜTZ (Breslau). On two previous occasions, a male, aged thirty years, had received from eighty to ninety cubic centimetres of a 10 per cent. iodoform glycerin injection into a cold abscess of thigh without any outward symptoms. One year later, upon recurrence of cold abscess, a similar injection of 100 cubic centimetres was made. Within twenty-four hours thereafter the temperature became elevated, and continued rising, with remissions, for days thereafter; but one week later most marked symptoms of iodism set in. The patient was covered with a diffuse acne. Added to this was a stomatitis, rhinitis, and conjunctivitis of such intensity that all the mucous membranes were coated with crusts. The urine contained a large percentage of iodine. On the part of the nervous system, the toxic symptoms manifested themselves in somnolence, great increase of patellar reflexes, ankle clonus, and increase of pulse. To evacuate any possible iodoform still existing in the abscess, an incision was made to afford an outlet. A saline infusion was given, but of no avail. The patient died with a temperature of  $104^{\circ}$  F. Post-mortem showed a spondylitis in lumbar region accounting for the cold abscess. The adrenals were caseous in their entirety, and there also existed a fatty degeneration of the kidneys. Something extraordinary must be responsible for the non-occurrence of any reaction after the earlier injections. The late appearance of poisonous symptoms must be attributed to a cumulative feature of iodoform, which, though it is soon eliminated as iodine in urine, remains longer in the system than other iodine preparations.

The pronounced cerebral disturbances, the increased reflexes, the acceleration of the pulse, and reference in the history to a yellowish pigment and very dry condition of the skin, are, in the light of post-mortem findings, brought into harmony with the marked degeneration of the suprarenal capsules; and, finally, the untoward fatal toxic symptoms are still further correlated to and enhanced by this pathological state of the adrenals which induced the pronounced cachectic condition, which in turn again favored iodism.

Conclusion: Saline infusions were futile. In view of possible fatal toxicity of iodoform, greater caution in its use should prevail, though so useful a remedy should not be abandoned.—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 1.

**II. Iodide of Potassium Treatment of Human Actinomycosis.** By DR. V. LIEBLEIN (Prag). The author herein offers a much-needed critique of the status of iodide of potassium as a curative agent in human actinomycosis. Sixty-two reported cases are analyzed, of which forty-two were healed, seven improved, two successfully treated, one without success, incomplete four, death six, the jaw being most frequently represented and the lung and intestine in about equal number. The iodide of potassium is most efficient in jaw actinomycosis, least in the pulmonary form. Where iodide of potassium alone was relied upon, three deaths ensued; but these were too advanced to be even benefited by operative treatment.

Of greatest interest are observations on the use of iodide of potassium after unsuccessful operative interference. Once death supervened, once marked improvement, and three times cured. One of the last group was twice ineffectually operated. The necessity of operative interference after unsuccessful application of iodide treatment arose three times. In these latter instances the iodide was given for too short a time.

At this point the author passes on to the method of giving iodide of potassium. It was only found serviceable when given



for several months or more. Treatment for one year or more was only called for in the severest cases.

As to the modes of action of iodide of potassium, it is pointed out that by the disintegration of the cellular infiltration, and its discharge through fistulous tracts, the expulsion of the ray fungus is effected. In support of this theory is the bacteriological observation that iodide of potassium does not inhibit the growth of the ray fungus, and coupled to this the clinical observation that the cases with sinuses coexisting come to a more speedy termination under iodide of potassium treatment. The advent of any mixed infection retards, and even wholly prevents, beneficial action of iodide of potassium. The quantity of iodide of potassium given fluctuated between 100 and 300 grammes; one case taking, *in toto*, even 4000 grammes. Recurrences were only apparent because of insufficient treatment, and disappeared wholly when properly administered. But recurrence also took place after operation, no matter how seemingly thorough it was done.

Limitations of iodide of potassium treatment, because of its slowness of action, exist when the disease is of an acute phlegmonous character, and when the individual is very cachectic. Here it is merely an adjuvant to surgical measures. In these respects we have analogous conditions in syphilis. Thus, while iodide of potassium is no specific, it is a remedial of no mean order antagonistic to actinomycosis, and worthy of an extended trial in proper doses for a long period in every instance. Thus, in Wölfler's clinic it is the practice to give three grammes in increasing doses three times daily. The affected area is also covered with compresses of iodide of potassium, or a tract or cavity tamponed with iodide of potassium gauze. The diminution in size of the swelling is ever slow but steady.—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 1.

## NERVOUS SYSTEM.

I. Nerve Suture. By DR. HUGO KRAMER (Heidelberg). This study embraces twenty-two cases in which nerve suture was

practised on divided musculospiral nine times, median eleven times, ulnar six times, and brachial plexus once. At the outset, attention is called to the criteria by which the success of neurorrhaphy should be judged. Thus, a return of sensation may be due to (*sensibilité supplée Letievant*) tactile impressions imparted to adjoining intact areas, or because of a free anastomosis of terminal nerve filaments. In like manner muscle function may be deemed restored, whereas compensatory muscles may be active, or a muscle may be innervated from two different sources, and, finally, anomalous innervation may coexist.

The percentage of successful restitution of sensation in twenty-seven instances amounted to 78 per cent. Analysis of the reports of various operators as to the relative merits of primary and secondary suture is seemingly in favor of the latter. This discrepancy is attributed to the infringements of asepsis unavoidably incident to primary suture of infected wounds, in consequence of which healing per primam, a *sine qua non* for nerve union, cannot result.

As to individual differences in the healing of enumerated nerves, chances seem to favor the musculospiral; but, again, this disparagement disappears when instances of the simultaneous division of median and ulnar nerve are subtracted. Inasmuch as a larger wound, under these circumstances, means greater defect, increased chances of infection, and greater scar, with protracted healing, these must needs delay active motions, and therefore constitute factors unfavorably influencing *restitutio ad integrum*.

As to the method of suture, better results attended direct suture, and no untoward effects marked the use of silk. Better functional restoration of muscles is to be looked for in those muscles nearest in relation with the central nerve stump and its subsequent growth. Associated division of tendons quite naturally retards restoration of function. Contracture of antagonistic muscles and faulty postural position of the hand likewise act adversely. As to return of sensation, Kramer holds

that no change is effected in the area of altered sensibility from the time of its diminution to that of complete healing, and only the intensity of altered sensation seems to be bettered. Trophic disturbance characterized by glossy skin is in direct proportion to the intensity of the anæsthesia. Vasomotor disturbance was most marked when the median and ulnar nerves were divided. The best prognosis can be offered in injury to musculospiral nerve.

In concurrence with other observers he it said that no complete *restitutio ad integrum* has been attained. At the most, what has been accomplished is that one or two muscles have been preserved, and this at times is a relatively great gain.

In conclusion, the author commends, where possible, primary nerve suture and immediate exercise of affected muscles as a routine.—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 3.

MARTIN W. WARE (New York).

## NECK.

I. Median Osteotomy of the Hyoid Bone. By DR. MAURICE VALLAS (Lyon). Vallas has devised an excellent means of gaining access to the lower part of the pharynx and the vestibule of the larynx. The operation is indicated for the removal of foreign bodies, of benign neoplasms, of epiglottal cancers, and for the treatment of syphilitic strictures. Tumors of the base of the tongue and even the whole of that organ may be removed by this method. Preliminary tracheotomy, at first thought necessary, has been given up.

Make a vertical median incision from the symphysis menti to the superior angle of the thyroid cartilage. Separate the fibres of the mylohyoid muscle in the middle line. Expose and divide the hyoid bone in its middle. Retract the two halves of the bone laterally along with the mylohyoid muscles. A space one and one-half inches wide is thus easily exposed. The lower part of

the wound is only separated from the pharynx by the thyrohyoid membrane, the upper part by the buccal mucosa. If the object of the procedure is to reach the lower pharynx, cut downward through the thyrohyoid membrane; if the root of the tongue is the objective, cut upward. The wound is closed by sutures. Drainage of the lower part of the wound is proper.

When excising the tongue, Vallas first ligates both lingual arteries, and through the same incisions removes the submaxillary glands. He then performs hyoid osteotomy as above described, but does *not* divide the thyrohyoid membrane. The submental wound is only separated from the mouth by the mucosa. An assistant opens the mouth with a suitable gag, and the surgeon, through the mouth, divides the frænum, the floor of the mouth, and the inferior and lateral connections of the tongue, including the anterior pillars of the fauces. The tongue is manipulated by a traction suture placed through it or by volsellum forceps. The tongue is now connected with the body by the hyoglossus muscles alone. Place the patient in a sitting posture with the head inclined forward, and proceed with the next step rapidly for fear of asphyxia. Pull the tongue out through the submental wound until the epiglottis appears. With the finger passed over the tongue feel for and recognize the two halves of the hyoid bone. With the scissors hugging the upper margin of the hyoid, divide the insertions of the hyoglossus muscle. This completes the operation. Closure of the wound, etc., is accomplished on ordinary surgical principles.—*Revue de Chirurgie*, May, 1900.

JOHN F. BINNIE (Kansas City).

## ABDOMEN.

I. Primary Resection of Gangrenous Herniæ. By DR. F. HOFMEISTER (Tübingen). Primary resection as opposed to artificial anus in gangrenous hernia is the plea of the author, supported by the utterances of Kocher twenty years ago, and again affirmed by experiences of Mikulicz ten years later. Statistics of

v. Bramman show that artificial anus performed in sixty-eight gangrenous herniæ gave a mortality of 45.6 per cent; author's twenty-five gangrenous herniæ with resection method showed but 40 per cent. mortality. All the operations were performed under Schleich's infiltration anæsthesia, and only division of constricting ring and dissection of the sac were painful at times because of the inaccessibility of these parts to proper infiltration. Exceptional ether was employed. The fate of the operation centres about the anatomical find of the proximal loop, as more marked changes are found in it than in the distal loop, as it is more affected by faulty taxis, and also the seat of postoperative lesions. For all of these reasons extensive resection of it is indicated up to that level where the mesenteric vessels vascularizing it are intact and the bowel therefore healthy. To gain the requisite oversight of the area of disease, and to insure a proper technique, extensive incision is to be practised (herniolaparotomy). All this is feasible under infiltration anæsthesia. At this stage the septic contents are allowed to flow from the proximal loop and lateral anastomosis practised. Indications for this operation hold good even in the presence of advanced age if the general condition be good. A beginning peritonitis with serosanguinolent or cloudy exudation is no contraindication. If the proximal loop is extensively involved, the extent of resection is only enlarged. The magnitude of the resection and the time necessitated for its performance are materially offset by the great gain accruing from the infiltration anæsthesia. This is evidenced in the condition of the patient at the end of the operation (one and one-half hours), as opposed to the collapsed state after general anæsthesia. If any doubt exists concerning the replaced bowel or peritoneum, the wound is filled with a Mikulicz tampon, and the radical operation abandoned.

*After-Treatment.*—Resort is had to enema until the bowel, by escape of flatus, proves its patency. Within the first days milk and fluids in small quantities were administered.

*Complications.*—Bronchopneumonia and pneumonia as causes of death are conspicuously absent. Deaths were principally traceable to faulty technique or conservatism in the extent of resection.—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 3.

## BONES AND JOINTS.

I. *Myositis Ossificans Traumatic.* By DR. OTTO ROT-SCHILD (Frankfurt). Following the severe traumatism of a wagon passing over the thorax and forearm, a male, thirty-eight years of age, found flexion and extension of the forearm limited to  $60^{\circ}$  and  $140^{\circ}$  respectively, because of a dense infiltration occupying the flexor muscles of the arm. This mass was intimately attached to the humerus.

*Operation.*—A long incision exposed this bony tumor, and showed it to embrace the brachialis anticus. At first sight, following the removal of this in its entirety, it seemed as if the periosteum were removed, to judge by rough bony masses; but further chiselling eventually revealed the intact periosteum beneath. The size of this osteomatous mass was ten centimetres long, six and one-half centimetres wide.

*Microscopically.*—The process was too far advanced to determine exactly the genesis; but there are all grades of muscle degeneration, evidenced in lack of staining, cloudy swelling, fibrillation granular appearance; there is little muscular hyperplasia. The bone formation is nowhere in contact with the muscle, and it appears to originate from the connective-tissue cells converted into osteoblasts of periosteal type subsequently changed into myositis ossificans.

A second case is that of a male over whose foot a heavy wagon passed. After ten weeks' treatment a bony mass was felt to replace the tendo-Achillis, starting from the os calcis. X-ray still further verified this, and operation was done. Microscopically, the findings were the same as above. Myositis ossificans of traumatic origin is omitted in all text-books. Its distin-

guishing feature from the myositis ossificans of progressive type lies in the nature of its isolated appearance, multiple foci being common to the former. It may be confounded with myositis syphilitica, but here concomitant data will help out.

*Prognosis* depends upon the connection of periosteum with bony mass or not. If the latter obtains, no recurrence need be expected.

*Operation.*—To guard against recurrences, the following precautions must be kept in mind:

(1) Not only the bony mass, but the entire muscle is to be extirpated. At any rate, as far as the dense ramifications extending into the muscles.

(2) To the extent of one centimetre about the growth the healthy periosteum is to be removed.

(3) The exposed bony surface is to be freed of all osteophytes as well as a removal of all that is pathological in compact layer of bone.

A summary of twenty-five cases on the literature is appended.  
—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 1.

MARTIN W. WARE (New York).

## REVIEWS OF BOOKS.

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MODERN SURGERY, GENERAL AND OPERATIVE. By JOHN CHALMERS DA COSTA, M.D., Professor of Surgery, Jefferson Medical College. Third edition. Philadelphia: W. B. Saunders & Co., 1900.

This is indeed a revised edition of Dr. Da Costa's work. It has been enlarged, and many of the defects, to which we called attention in our review of the first edition, have been eliminated. On the whole, the book does credit to its author and publishers.

If there is any particular feature wherein it differs from other books of its kind, it is in the general precedence given to palliative and medical measures as distinguished from radical and surgical measures. Thus, under the subject of inflammation the author gives a section on the constitutional treatment, in which are considered (1) general bleeding, (2) arterial sedatives, (3) cathartics, (4) diaphoretics, (5) diuretics, (6) anodynes, (7) antipyretics, (8) emetics, (9) mercury and iodine, (10) stimulants, and (11) tonics. Under these various heads a large number of drugs are considered.

In the treatment of tetanus he says that "every wound must be disinfected with the most scrupulous care. Every punctured wound is to be incised to its depth and thoroughly cleaned and drained." This will keep surgeons busy.

A series of golden rules is laid down for guidance in the treatment of hæmorrhage. There are fifty of these rules, which cover pretty generally the whole of the subject. The student of surgery can study them with profit.

The author agrees with Stimson in the treatment of fracture of the patella. He says that operative measures can be used with



confidence when surrounded with every protection. He habitually uses them, but he never teaches them as a proper routine practice, and strongly advises against their use except by those who have had experience in operating, who have formed the habit of taking precautions, and who have the aid of skilled assistants. The whole chapter on fractures and dislocation is practical and conservative. A picture illustrating subcoracoid dislocation of the humerus is particularly worthy of favorable mention.

The discussion of acute traumatic pneumothorax is valuable because it contains accounts of the methods of Matas and the Fell-O'Dwyer apparatus.

The author advises the conservative line in the treatment of appendicitis. The general judgment expressed on this subject is in accord with the most popular view at the present time. McBurney would take exception, however, to the statement that "The point of greatest tenderness is known as McBurney's point."

The chapter on operations upon the abdomen is systematic, clear, and gives the important and necessary details for this branch of surgery. The same may be said of the chapter on anæsthetics. Both of these contain many practical points, and show not only a masterly grasp of the subject, but also an appreciation of the needs of the student and practitioner. The same practical familiarity with the subject is evidenced in the chapter on the X-rays. The chapter on the surgery of electricity and lightning is the best that we know of in any of our text-books on general surgery.

The treatment of the subject of intra-abdominal hæmorrhage is neither as full nor as complete as it should be in a work of this kind. It is confused with abdominal traumatism, and the main point is missed. This is all the author has to say under the treatment of rupture of the spleen. "Ballance tells us that after splenic injury there is shock, but after a time there is a distinct reaction. Wait for the reaction, and when it occurs remove the spleen." In gall-bladder surgery, we look for cholecystitis in vain.

The work of Maurice H. Richardson is in places attributed to Morris Richardson, and in other places to Morris H. Richardson.

We take this occasion, without reference to any particular work, to express our unqualified condemnation of a certain class of pictures which is too prevalent in surgical books. We refer to illustrations introducing features which should in the name of modern surgery be excluded,—features which are inconsistent with the words of the text. Here we find illustrated an operation for trephining done through the unshaven, hairy scalp; here we find the operation for ligating the axillary artery being performed in the presence of a luxuriance of axillary hair; here is an illustration of how to amputate the thigh, showing the surgeon and assistants clothed in street-coats; here are a pair of cuffs, ornamented with buttons that look like ancestral heirlooms and reaching nearly to the knuckles of hands, engaged in what purports to be a clean operation. All this is wrong; it is misleading and pernicious. If the text is accurate, so should the illustrations of the text be accurate. The author interprets these pictures correctly, and the readers of the ANNALS OF SURGERY are not misled by them. We recognize the allegorical features of the art. But some less fortunate *confrère* may take the picture literally as a guide. And while we plead for illustrations which are not a slander upon the art of surgery, let us at the same time hope for the elimination from surgical books of inartistic pictures, bizarre forms, anatomical monstrosities, and caricatures of faces, which are travesties, and which can only have the effect to detract from the seriousness of a noble subject.

Dr. Da Costa's book is comparatively free from these objectionable features. The revised edition is a great improvement over the first edition. It is sound on the principles of surgery, and is a safe guide to be in the hands of the surgeon.

JAMES P. Warbasse.

PROGRESSIVE MEDICINE. Edited by HOBART AMORY HARE, M.D.,  
Vol. iii. September, 1900. Philadelphia: Lea Brothers  
& Co.

This volume contains chapters on diseases of the thorax and its viscera by William Ewart, diseases of the skin by Henry W. Stelwagon, diseases of the nervous system by William G. Spiller, and on obstetrics by Richard C. Norris. Although these subjects involve chiefly matters of non-surgical character, still, the authors have introduced a very considerable amount of surgical literature.

In the first chapter empyema is considered; and the developments which the past year has witnessed are presented. Hernia of the diaphragm and hydatid cysts of the lung receive attention. A successful operation by Meyer for gangrene of the lung is referred to. In the surgical treatment of pericarditis, E. Rotter raises the parietes in the shape of a square door hinged at the sternal insertion of the costal cartilages. A much easier operation for draining the pericardium is that of Ogle, which exposes the sac at its attachment to the diaphragm. Lilienthal's successful case of operation for purulent pneumococcal pericarditis, in which forty ounces of pus were removed from the pericardium of a boy aged fifteen years, demonstrates the inadequacy of aspiration. The literature bearing upon wounds of the heart is also reviewed.

The subcutaneous injection of gelatin for the relief of internal hæmorrhage, hæmoptysis, hæmaturia, and intestinal hæmorrhage has found a place in surgery. This volume gives the technique and also reports of cases in which this hæmostatic agent has been employed. It seems to be of especial value in hæmophilia. Polyakoff has used it by mouth in a case of gastric ulcer; and a report of Kaye's prophylactic injections prior to amputation is given. There are also references to the hæmostatic property of suprarenal extract and epinephrin.

The chapter on the diseases of the skin contains all that is new on this subject. The treatment of kiloid by the injection of

creosote and olive oil, and the new experiences in the study and treatment of lupus are given.

The author of the chapter on diseases of the nervous system has collected the literature bearing on the cerebral symptoms in carcinoma. A very considerable amount of evidence has been compiled, pointing to peculiar cerebral symptoms in cases of carcinoma growing outside of the nervous system. Some of these nervous disturbances have been accounted for by microscopic deposits of carcinomatous cells in the brain, others by assuming the presence of peculiar toxins.

Probably no section in this volume contains more of surgical value than that on tumors of the brain. Particular reference is made to Bramwell's recent paper on that subject. This involves a study of forty cases with necropsies which this one author has had. From this we learn that intracranial tumor of considerable size may be entirely unsuspected during life; that a large part of the cortical motor area may be destroyed without causing paralysis; that closure of the foramen of Magendie may give the symptoms of tumor; and that if men would sacrifice their vanity to the extent of publishing their mistaken diagnoses in important cases we should probably learn more than we do from cases in which a very careful diagnosis is made after the necropsy has been performed.

The experiments of Bier, Zeidler, and Seldovitch in the production of anæsthesia by the injection of cocaine into the spinal canal are given.

Spinal changes in carcinoma, spinal tumors, lesions of the cauda equina, spinal hæmorrhage, tic douloureux, and senile changes in the spinal cord are some of the subjects treated under the head of spinal cord lesions.

The chapter on obstetrics deals also with subjects which belong in the field of surgery of the female pelvic organs.

JAMES P. WARBASSE.

THE PHONENDOSCOPE AND ITS PRACTICAL APPLICATION. By AUREOLI BIANCHI, M.D., Parma. Translated by A. GEORGE BAKER, A.M., M.D. Philadelphia: G. P. Pilling & Son, 1898.

This is a translation of the lectures of Professor Bianchi upon the phonendoscope, an instrument which was presented before the International Medical Congress in Rome in 1894.

These lectures deal with the practical application of the phonendoscope. The author also describes such special application as the phonendoscopy of the thoracic viscera, of the liver, colon, stomach, larynx, and of the pregnant uterus, and of muscular sounds. In these lectures it is claimed that this instrument is much more delicate and vastly wider in its scope of usefulness than the stethoscope. It is certainly an invaluable aid in diagnosis, if every physician can do with it what its inventor is able to do.

We observe that the instrument is patented and the trade-mark registered by the author of the book, and that the publishers are the sole agents for the instrument in the United States. Similarly, in taking up recently an instrument which is being widely brought to notice as an aid in the diagnosis of renal affections, devised by a Chicago surgeon of repute, the patent-mark was found conspicuous upon it. Truly, the spirit of commercialism is making inroads upon the traditions of medicine, and the teaching "Freely ye have received, freely give" is being forgotten.

JAMES P. WARBASSE.

TRANSACTIONS OF THE SOUTHERN SURGICAL AND GYNÆCOLOGICAL ASSOCIATION. Vol. xii. Published by the Association, 1900.

This volume contains the papers and discussions presented before the twelfth session of this Association, held at New Orleans, Joseph Taber Johnson being President.

The President's address is a gynæcological panegyric. In abdominal surgery, he says, few general surgeons equal and none

surpass the gynæcologist. Gynæcology is not only good, but it is great and ever-expanding. Witness the following: "We attack ulcers and abscesses of the stomach and anastomose that organ with the intestine. We do all the surgery of the kidney and the ureter, of the liver and the gall-bladder, of the intestines, the spleen, and the pancreas. We operate for appendicitis and for all the varieties of hernia, and do the surgery of the bladder, the rectum, and the mammary gland.

"We operate for gunshot and stab wounds of the abdominal viscera upon men, women, and children, and invade the field of the truly medical practitioner in cases of perforated typhoid ulcers." Thus the torso is snatched from the surgeon, who must turn gynæcologist or find himself marooned with the human head, legs, and arms.

The scientific papers in this volume are on the whole of a high class. Dr. Bovée has a paper on ureterectomy, and Dr. H. H. Grant one on the treatment of gunshot wounds of the abdomen, which are worthy of note. Dr. Rudolph Matas has given a paper on intralaryngeal insufflation for the relief of acute surgical pneumothorax, with a description of the latest devices for the purpose. It will be remembered that this author has already contributed a valuable paper on this subject, and which has been referred to in these columns. This is a more complete discussion of the subject, and merits the attention of every surgeon. "Until the danger of seriously interfering with the respiratory functions, by inducing acute collapse of the lungs, is clearly eliminated or is reduced to a safety minimum, the analogy between the pleura and the peritoneum, from the surgical point of view, will never exist."

Dr. W. P. Nicolson reports a case of inflammation of Meckel's diverticulum, with resulting gangrene of the intestine simulating appendicitis; Dr. H. M. Taylor has a paper on operations for typhoid perforation, in which he reports five cases upon which he has operated for this lesion. This paper is a valuable contribution to the literature of surgery.

Dr. Edwin Walker reports a case of *Bilharzia hæmatobia*

occurring in this country. Dr. Richardson's paper on œsophageal diverticula was read before this society.

Dr. Howard A. Kelly has a paper on the exploration of the abdomen as an adjunct to every cœliotomy. He advises the surgeon to take advantage of an opening of the abdomen to make a systematic exploration with the view of determining the presence or absence of diseases other than that for which the opening was made. Appendicitis, hernia, hydro-ureter, disease of the omentum, pyloric cancer, movable kidney, and gall-stones are conditions which such an examination may reveal. Cases are cited showing the advantages which the author has derived from having made these examinations. For this purpose he wears a rubber glove reaching nearly to the elbow; and when the size of his wound will permit he makes an ocular inspection as well.

JAMES P. WARBASSE.

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ANNALS OF SURGERY,

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# CONSERVATIVE OPERATIONS FOR RENAL RETENTION.

By CHRISTIAN FENGER, M.D.,

OF CHICAGO,

PROFESSOR OF CLINICAL SURGERY IN THE NORTHWESTERN UNIVERSITY AND  
IN THE RUSH MEDICAL SCHOOLS.

It is only in the last decade that this new branch of surgery has come into existence, and, as it is still young and not well developed, the technique of the methods of operation is not yet well defined. The number of operations already performed, however,—and there are about thirty on record,—permits us to form an idea not only as to the justifiability of the object aimed at, namely, the salvation of the kidney, doomed to removal, which may be considered as firmly established, but also as to the general direction in which the different methods of operating, which are already well grouped, must be developed for further perfection.

This subject has already been made accessible to the profession at large by the articles in the larger modern handbooks,—in France by Albarran<sup>1</sup> and Tuffier,<sup>2</sup> and in the English literature by Henry Morris<sup>3</sup> and Fenger.<sup>4</sup>

The field for this group of operations has thus far been limited to the kidney and the upper portion of the ureter, and it is this territory that has been the object for direct operative attacks in renal retention. This has naturally come to pass because it is accessible and the operations are reasonably safe and easy, and because the majority of the unilateral retentions are located in this region.

Unilateral obstruction to the flow of secreted urine may be located from the kidney downward

(a) In the neck of a calyx.



- (b) In one branch of the ureter.
- (c) At the exit of the ureter from the renal pelvis, and
- (d) In the course of the ureter.

It will be seen from the tabulated statement of cases that the exit of the ureter from the renal pelvis was by far the most common location for the obstruction: twenty-six operations for obstruction in this locality are recorded as against one in a branch of the ureter, and three in the ureter below the pelvis.

There have been excluded from this consideration

(a) Nephrotomy and drainage.

(b) Nephropexy, to correct and straighten out a bend in the upper end of the ureter caused by descent of the kidney.

(c) Catheterization of the ureter from below to overcome retention from stricture or bending.

These procedures have been excluded, not because they do not deserve earnest consideration, as they are in some cases sufficient for cure, but because this paper must be limited to operations which directly attack the place of obstruction. I shall also leave out of consideration those cases of obstruction in which calculus is the cause of the retention, which is relieved by the removal of the stone.

*I. Obstruction located in the Kidney, namely, in the Calyces, or in One Branch of the Ureter; Partial Cystonephrosis.*—The operation to relieve this condition is bisection of the kidney and division of the partition walls between the sacs and the pelvis, thus making a unilocular out of a multilocular cavity or sac. If no obstruction be found at the exit of the pelvis or in the ureter, no further operation is required, as in removal of stones from the calyces or pelvis of the kidney. If no stones are found it is probable that there is obstruction below this point in one of the locations mentioned, and this must be overcome by one or another of the operations which have been devised for the relief of obstruction in these localities.

Hæmorrhage from the division of voluminous partition walls may be overcome by the Paquelin cautery, ligation, or continuous suture.

Only one case of this variety has been recorded by Fenger (No. 9).<sup>5</sup>

II. *Obstruction located at the Exit of the Ureter from the Renal Pelvis.*—This variety possesses naturally the greatest practical interest, as it is the most frequent site of non-calculous obstruction. Twenty-six of the operations collected were for obstruction at this point, and the methods of operation were quite varied. The condition found was either valve-formation without stricture of the ureter, from unilateral dilatation of the pelvis and consequent oblique insertion of the ureter on the side of the dilated pelvis rather than at its lowest point, or stricture of the ureter at its exit with insertion either at the lowest part of the pelvis or on the side higher up.

The operations to re-establish free passage of the urine through the place of obstruction have varied with the existence or non-existence of stricture of the ureter, and with the point from which the valve-formation is attacked, either from within through an opening in the pelvis or the bisected kidney,—transpelvic operation,—or from without,—extrapelvic operation.

Finally, the distorted shape of the pelvis has been made the object of operation, pyeloplication and capitonnage.

*Transpelvic Operation on Valve, Section of Ureteropelvic Spur, Amelioration of Ureteral Orifice.*—This is the oldest of the plastic operations in this locality, and was first done by Trendelenburg<sup>6</sup> in 1886. Nine cases are on record, operated upon by Trendelenburg, Fenger,<sup>7</sup> Mynter,<sup>8</sup> Bardenheuer,<sup>9</sup> Fenger,<sup>5</sup> Helferich,<sup>10</sup> Israel,<sup>11</sup> Gerster,<sup>12</sup> and Fenger,<sup>13</sup> in chronological order.

Valve-formation from oblique implantation of the ureter was first seen through the divided pelvis or kidney (cystonephrotic sac); it was natural, therefore, that the first attempts at widening the opening into the ureter should be made from inside the pelvis.

The valve formed by the oblique implantation of the ureter into the side of the dilated pelvis is seen through an incision in the dilated pelvis or through the bisected kidney,

and the valve, that is, the wall of the pelvis and ureter in contact with each other, divided. This is done either by one incision sufficiently long to secure an amply wide opening into the ureter, or, better, to the bottom of the pelvis, or by multiple incisions of the valve (this was incised in three places by Gerster).

In all the cases the incision was closed transversely by sutures, one of which united the upper and lower ends of the incision, and others which united the divided walls of the ureter to those of the pelvis throughout the whole extent of the divided surface.

This operation was performed in nine cases: two patients died, one from ileus (Trendelenburg, No. 1) and one from uræmia in a case of bilateral disease (Helferich, No. 12). In two cases the operation was not successful; in one, where obliteration of the ureter at the seat of operation followed (Fenger, No. 23), and one in which the operation was temporarily successful, as the ureter remained open for about one year, after which relapse occurred, the ureter closed, and a second operation became necessary (Gerster, No. 15).

In five cases the operation was successful (Fenger, No. 3; Mynter, No. 7; Bardenheuer, No. 8; Fenger, No. 9, and Israel, No. 14).

*Extrapelvic Operations.*—(1) Resection of ureter and reimplantation in renal pelvis,—uretero-pyelo-neostomy (Küster). Six resections have been made by Küster,<sup>14</sup> Van Hook,<sup>15</sup> Bardenheuer,<sup>16</sup> Bazy,<sup>17</sup> Bazy,<sup>17</sup> and Morris.<sup>18</sup> A stricture in the upper end of the ureter led Küster to excise the strictured part of the ureter, although he had planned to make a transpelvic division of the valve. Resection and reimplantation proved successful in Küster's case (No. 2), Bardenheuer's (No. 6), and in one case of Bazy's (No. 17). Bazy's second patient, a case of calculous anuria (No. 18), died from sepsis,—iodoform poisoning. In Van Hook's case (No. 5) the result was uncertain, as an extensive stricture in the ureter below necessitated immediate nephrectomy. In Morris's case (No. 22) the operation was planned, but the operator abandoned

his plan and made an immediate nephrectomy, which he considered to be demanded by the extreme atrophy of the ureter.

It will thus be seen that resection and reimplantation of the ureter in the pelvis proved successful in three and was abandoned for nephrectomy in two cases. It was followed by death in one case from sepsis, a result that cannot be considered as attributable to the operation as such.

(2) Operation on ureter and pelvis at the seat of the valve or stricture (Fenger). It was the same condition that obtained in Küster's case, namely, a stricture in the pelvic end of the ureter, that caused Fenger to abandon an intended transpelvic operation and to resort to extrapelvic division of the ureter from below the stricture up into the pelvis, followed by transverse union of the longitudinal wound.

This operation has been performed in eleven cases, and none of the patients has died. In some of the cases there was stenosis of the pelvic end of the ureter, and in others the obstruction was caused solely by the oblique implantation of a normal ureter. In one case (Fenger, No. 20)<sup>19</sup> the operation was unsuccessful and was followed by nephrectomy. In the other ten cases (Fenger, Nos. 4,<sup>20</sup> 9,<sup>21</sup> 30;<sup>19</sup> Albarran, Nos. 25,<sup>22</sup> 26;<sup>23</sup> Bardenheuer, No. 16;<sup>24</sup> Richardson, No. 19;<sup>25</sup> Delbet, No. 24;<sup>26</sup> Kelly, No. 21;<sup>27</sup> Morris, No. 28)<sup>3</sup> the operation was followed by successful functional results. In one of Albarran's cases (No. 25)<sup>22</sup> the operation was combined with partial excision of the dilated pelvis—capitonnage—to re-establish the normal shape of the pelvis.

In one case only (Bazy, No. 17)<sup>17</sup> was the kidney approached through the peritoneal cavity by lateral laparotomy; in the other ten cases extraperitoneal lumbar incision was made.

(3) Pyeloplication. Plastic operation on the renal pelvis (Israel); capitonnage (Albarran). In lateral implantation, when the ureteral orifice is of normal calibre, the passage of urine would be free were the ureter inserted at the lowest part of the pelvis, or if the normal shape of the pelvis were re-

established. This has been accomplished by the following operations on the pelvis:

(a) Shortening the excess of pelvic wall by folding it in towards the lumen of the pelvis and uniting the folds by sutures (pyeloplication of Israel; pelvioplication of Albarran).

(b) Excision of part of the wall of the dilated pelvis and closure of the defect by sutures (capitonnage of Albarran).

In Israel's case (No. 13)<sup>11</sup> the operation sufficed to re-establish the flow of urine and effect a cure. In the case of Albarran (No. 26)<sup>23</sup> pelvioplication was made, and in case No. 25<sup>22</sup> the same operator made a partial excision of the superabundant portion of the sac-wall with a portion of the kidney, but in both of these cases the operation was combined with extrapelvic operation on the valve.

Israel's case is the only one in which pyeloplication alone was effective in relieving the obstruction.

III. *Obstruction located in the Ureter.*—(1) Uretersorthosis. This operation, first performed by Rafin and reported by Verrière,<sup>28</sup> consists in loosening the adhesions around a bend in the ureter. The upper end of the ureter below the renal pelvis is made impervious by a bend due to descent of a floating kidney. In Rafin's case the bend was double and S-shaped. The bend was buried in connective-tissue adhesions which prevented the straightening of the ureter. After division of these adhesions without opening the ureter, it was straightened, and remained straight and permeable after the kidney had been replaced and retained by nephropexy. One successful case (No. 27) is reported by Rafin.

(2) Plastic operation on the ureter (Fenger). Longitudinal division of the strictured or obliterated ureter through the stricture into the normal ureter above and below it, followed by transverse union of the ureteral incision by folding the ureter upon itself, has been performed by Fenger in two cases, and was effective in both. In one (No. 11),<sup>29</sup> a valve was excised from the inside of the opened ureter at the point of occlusion; in the other (No. 29),<sup>19</sup> complete occlusion of

the ureter had followed a plastic operation on a stricture caused by a stone in the ureter. The second plastic operation through the then obliterated ureter was successful, notwithstanding that great tension was made on the ureter after folding and suture. This case demonstrated that an operation for reopening a closed ureter may be successful after an unsuccessful attempt has been made, and this justifies even repeated attempts to re-establish the patency of the ureter, and thereby save the kidney from removal.

### CONCLUSIONS.

(1) *Choice of Operation.*—The choice of operation comes into question only in the cases of obstruction at the pelvic orifice of the ureter (unilateral implantation with or without stricture of the ureter at this point), and lies between transpelvic plastic operation, extrapelvic incision and plastic operation, and pyeloplication.

Transpelvic plastic operation may be the operation of necessity in large cystonephrotic sacs because of the difficulty in reaching the ureter outside of the pelvis (in nine cases, two were followed by obliteration). In smaller sacs with moderate dilatation of the pelvis, I consider extrapelvic plastic operation preferable to transpelvic plastic operation and to resection and reimplantation of the ureter (uretero-pyelo-neostomy): Resection was practised in six cases. In two the operation was incomplete and was followed by nephrectomy. It was successful in three cases and functionally successful in one (Bazy, No. 18). One patient died from iodoform poisoning or sepsis. Thus it proved effective in all the four cases in which the operation was completed.

Extrapelvic plastic operation was chosen by most of the operators. It was performed eleven times,—was successful in ten cases with good functional results, and was unsuccessful in one case. It would thus seem that this should be the operation of choice by reason of the results obtained, and because its technique is relatively simple.

(2) *Danger to Life*.—The risk to life from this entire group of conservative operations for renal retention is small. Three of the thirty patients died, but in none of them was death due to the operation *per se*. In Trendelenburg's case, the patient died from ileus, and both Helferich's and Bazy's patients had bilateral disease, and could not have been saved by nephrectomy.

(3) *Effect of the Operations*.—The results of the operations to re-establish evacuation of urine, and thus save the kidney, were as follows:

(a) Non-effective. The operation was non-effective in five cases, in four of which nephrectomy was performed (Van Hook, No. 5; Fenger, No. 20; Morris, No. 22; Fenger, No. 23), with no deaths. In one case (Gerster, No. 15) a urinary fistula returned.

(b) Functionally effective. The operation was functionally effective in twenty-two of the thirty cases; that is to say, twenty-two out of thirty kidneys, or 73 per cent., have been saved from nephrectomy. In a few of these cases a mucous fistula still remained at the time of publication, but an almost dry mucous fistula, leading probably to a suture or ligature, will close in time, and will never necessitate the removal of a kidney the urine from which passes into the bladder.

CHRONOLOGICAL TABLE OF OPERATIONS FOR RENAL RETENTION.

No.	Operator.	Date.	Operation.	Result.			
				Recov.	Death.	Mucous Fistula.	Nephrec- tomy for Urinary Fistula.
1	Trendelenburg.	1886.	Transpelvic division of valve.				
2	Küster.	July 14, 1891.	Resection of ureter. Implantation in pelvis. Uretero-pyelo-neostomy.				
3	Fenger.	May 31, 1892.	Transpelvic plastic operation on valve.				
4	Fenger.	Nov. 26, 1892.	Extrapelvic plastic operation. Stricture of upper end of ureter.				
5	Van Hook.	1892.	Resection.				
6	Bardenheuer.	March 24, 1893.	Uretero-pyelo-neostomy.				
7	Myer.	Aug. 14, 1893.	Transpelvic plastic operation.				
8	Bardenheuer.	Jan. 28, 1894.	Transpelvic plastic operation.				
9	Fenger.	Sept. 17, 1894.	Extrapelvic operation on valve at exit of pelvis.				
10	Fenger.	Nov. 17, 1894.	Transpelvic plastic operation on valve.				
9	Fenger.	April 13, 1895.	Bisection of kidney. Division of valve in lower branch of ureter.				
11	Fenger.	Aug. 6, 1895.	Plastic operation on ureter. Excision of valve.				
12	Heiferich.	Nov. 13, 1895.	Extrapelvic plastic operation. Bilateral disease.				
13	Israel.	1896.	Pyeloplication.				
14	Israel.	1896.	Transpelvic plastic operation on valve.				
15	Gerstner.	Feb. 6, 1896.	Transpelvic plastic operation on valve.				
16	Bardenheuer.	Feb. 17, 1896.	Extrapelvic plastic operation.				
17	Bazy.	July 27, 1896.	Resection. Uretero-pyelo-neostomy.				
18	Bazy.	Oct. 13, 1896.	Resection. Uretero-pyelo-neostomy.				
19	Richardson.	Nov. 11, 1896.	Extrapelvic operation.				
20	Fenger.	1897.	Extrapelvic operation.				
21	Kelly.	1897.	Extrapelvic operation.				
22	Morris.	1897.	Resection attempted.				
23	Fenger.	Feb. 22, 1898.	Transpelvic operation on valve. Obliteration of ureter at place of operation.				
24	Delbet.	1898.	Uretero-pyelo-neostomy.				
25	Albarran.	1898.	Uretero-pyelo-neostomy.				
26	Albarran.	1898.	Pyeloplication.				
27	Albarran.	1898.	Extrapelvic plastic operation.				
28	Rafin (Verrière).	Nov. 12, 1898.	Ureterolysorhosis.				
29	Morris.	1898.	Extrapelvic plastic operation.				
30	Fenger.	May 23, 1899.	Extrapelvic plastic operation on ureter.				
	Fenger.	July 9, 1899.	Extrapelvic plastic operation on pelvis and ureter.				

Uremia,  
ninth day.With  
fistula.

Unpublished.

Unpublished.

Unpublished.

Unpublished.



TABLE OF OPERATIONS FOR RENAL RETENTION.

I. BRANCH OF URETER.

Chronological. No.	Operator.	Date.	Age.	Sex.	Disease.	Operation	Result.				Bibliographical. No.
							Recov.	Death.	Miscous Fistula.	Nephrec- tomy for Urinary Fistula.	
4	Fenger.	April 13, 1895.	22	M.	Gonorrhœa. Renal colic. Lumbar nephrotomy. Passage of stones through fistula. Intermittent ob- struction of ureter. Oper- ation for oblique implan- tation and stricture of pelvic end of ureter. Uri- nary fistula. Pyelitis. Sacculated kidney.	Incision through fistula and old cicatrix into sacculated kidney. Could not find entrance to ureter. Bisection of kidney and division of partition walls between calyces. Ureter patent. Plastic operation on ureteral en- trance; incision with transverse union of wound. Four months later, reunion of bi- sected kidney. Five months later, fistula closed spontaneously.	.....	.....	.....	5	

II. URETER AND PELVIS FOR VALVE-FORMATION OR OBLIQUE INSERTION, WITH OR WITHOUT STENOSIS OF UPPER END OF URETER.

A.—Transpelvic Operation on Valve.

1	Trendelen- burg.	1886.	...	...	Large hydronephrosis.	Anterior wall of sac opened by lateral laparot- omy. Division of ureter to lower part of sac. Suture of divided borders of ureter to inner wall of sac. Displacement of ure- teral opening to bottom of sac.	?	Ileus.	...	.....	6
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3	Fenger.	May 31, 1892.	28	F.	Valvular stricture or stenosis of pelvic orifice of ureter in somewhat floating kidney. Intermittent hydronephrosis for eight years.	Nephrotomy in interval between attacks. No stone in pelvis. Pelvic orifice of ureter not found. Incision of pelvis. Valvular opening seen. Plastic operation on valve. Fixation of floating kidney.	.....	.....	7
7	Mynter.	Aug. 14, 1893.	25	M.	Intermittent hydronephrosis for twelve years.	Lumbar incision. Valve-formation. Transpelvic operation on valve through incision one inch long, prolonged downward through valvular stricture.	.....	.....	8
8	Bardenheuer.	Jan. 28, 1894.	45	F.	Right pyonephrosis.	Bisection of kidney. Intrapelvic division of ureter and sac to bottom of sac. Union of ureter to sac.	.....	.....	9
10	Fenger.	Nov. 17, 1894.	28	F.	Large aseptic remittent cystonephrosis in movable kidney for seven months.	Lumbar nephrotomy. Drainage. Two months later, sac retracted one-half. Transpelvic operation on valve. Division of wall of ureter and pelvis to bottom. Suture.	.....	.....	5
12	Helferich.	Nov. 13, 1895.	25	F.	Intermittent left hydro- or pyonephrosis.	Bisection of kidney. Division of ureter. Implantation of lower end of divided sac. Uremia. Bilateral disease.	Ninth day.	.....	10
14	Isnel.	1896.	11	M.	Right intermittent hydro- or pyonephrosis, colic, etc., for two years.	Lumbar incision. Kidney double ordinary size. Lateral implantation and bend at origin of ureter. Adhesions. Incision in posterior wall of pelvis. Valve divided with scissors, ureteral mucosa united to pelvic mucosa. No permanent catheter.	.....	.....	11
15	Gerster.	Feb. 6, 1896.	9	M.	Trauma, 1895, hæmaturia (rupture of kidney or ureter). Six months later, tumor in right hypochondrium. Large aseptic cystonephrosis. Oblique implantation and stricture of pelvic end of ureter.	Transpelvic operation. Division of valve and stricture in three places, and partial excision of valve. Lumbar fistula closed after six months, remained closed six months, then reopened, necessitating another operation.	.....	.....	12

TABLE OF OPERATIONS FOR RENAL RETENTION.—Continued.

Chronological. No.	Operator.	Date.	Age.	Sex.	Disease.	Operation.	RESULT.				Bibliographical. No.
							Recov.	Death.	Mucous Fistula.	Nephrec- tomy for Urinary Fistula.	
23	Fenger.	Feb. 22, 1898.	23	F.	Right intermittent hydro- nephrosis for five years.	Lumbar incision. Multilocular hydronephro- sis. Incision of sac. Eversion of its inner side. Division of partition walls between dilated calyces. Intrapelvic division of exit or valve of obliquely inserted ureter and corresponding wall of pelvis to bottom. Suture of ureter to pelvis. Fistula. Three months later extrapelvic plastic operation. Ureter completely obliterated. Valve in lower end of ureter persisting. Urinary fistula, 1899. Nephrectomy.	.....	.....	.....	Obliter- ation of ureter at seat of opera- tion.	13
2	Klister.	July 14, 1891.	11	M.	Left open hydronephrosis. Lumbar nephrotomy. Vesical anuria and fistula. One year later dilatation of fistula. Catheteriza- tion of ureter impossible. Septic pyelitis.	Lumbar extraperitoneal incision. Ureter not found. Incision of dilated pelvis. Ureter in or on posterior dilated wall of sac. Division of pelvic wall of ureter prevented by stricture of ureter two centimetres below pelvis. Di- vision of ureter to stricture. Resection of ureter. Divided end of ureter unfolded and sutured to opening in sac. Four months later fistula closed by curetting, dilating, and closing canal by sutures.	.....	.....	.....	.....	14

*B.—Resection and Reimplantation of Ureter.*

5	Van Hook.	1892.	19	...	Infected cystonephrosis.	Nephrotomy. Urinary fistula. Oblique implantation, valve. Resection of ureter. Reimplantation in pelvis. Exploration of ureter below. Obliteration lower down for several inches.	...	...	...	15
6	Bardenheuer.	May 24, 1893.	49	M.	Right cystonephrosis.	Lumbar operation. Unilateral oblique implantation for five centimetres. Resection of ureter. Implantation in deepest part of sac. Small fistula six months later.	...	...	...	16
17	Bazy.	July 27, 1896.	40	M.	Non-intermittent hydronephrosis.	Transperitoneal operation. Median incision. Ureter inserted at middle of sac. Resection of four centimetres of ureter. Implantation in lower portion of sac. Resection of portion of pelvic sac. Catheter from ureter through pelvis and out through abdominal wound.	...	...	...	17
18	Bazy.	Oct. 13, 1896.	48	M.	Hæmaturia. No pain. Large right kidney calculus anuria for three days.	Lumbar incision. Bilobate kidney. Stone and old coagulum in pelvis. Ureter very hard and dilated. Resection and implantation. Death from infection. Operation a mechanical success.	...	Iodoform poisoning or sepsis.	...	17
22	H. Morris.	1897.	56	...	Intermittent hydronephrosis. Extrapelvic operation, unsatisfactory.	Kiister's operation. Uretero-pyelo-neostomy. Ureter thin and small. Operator not satisfied.	...	...	...	18

*C.—Extrapelvic Operation on Valve and Stricture.*

4	Fenger.	Nov. 26, 1892.	47	M.	Traumatic stricture of ureter close to pelvis of kidney. Intermittent pyonephrosis for four years.	Nephrotomy. Sacculated kidney. No stone found. Ureteral entrance not found. Incision of pelvis. Longitudinal ureterotomy showed stricture. Longitudinal incision of stricture and plastic operation on ureter and pelvis.	...	...	...	20
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TABLE OF OPERATIONS FOR RENAL RETENTION.—Continued.

Chronological No.	Operator.	Date.	Age.	Sex.	Disease.	Operation.	Result.				Bibliographical No.
							Recov.	Death.	Miscous Fistula.	Nephrec- tomy for Urinary Fistula.	
9	Fenger.	Sept. 17, 1894.	21	M.	Gonorrhoea. Renal colic. Lumbar nephrectomy. Passage of stones through fistula. Intermittent ob- struction of ureter.	Operation for oblique implantation and stric- ture of pelvic end of ureter.	...	.....	.....	.....	21
16	Barden- heuer.	Feb. 17, 1896.	32	F.	Intermittent hydronephro- sis for five years. Mova- ble kidney.	Incision from pelvis through spur into ureter below. Transverse union of longitudinal wound.	...	.....	.....	.....	24
19	M.H. Rich- ardson.	Nov. 11, 1896.	29	F.	Intermittent hydronephro- sis for eight or ten years. Gall-stone suspected. Coe- liotomy. Gall-bladder normal, but retroperito- neal tumor in region of kidney.	Ureteroplasty. Lumbar incision. Ureter found inserted in inner convexity of dilated pelvis, collapsed and flattened. Lifting up kidneys straightened ureter. Change of pelvic outlet of ureter into funnel-shaped mouth. Ureteroplasty on principle of pyloro- plasty.	...	Nine months?	.....	.....	25
20	Fenger.	March, 1897.	38	F.	Remittent infected cystone- phrosis in floating kidney. Renal stone passed per urethram. Stricture of ureter.	Extrapelvic operation. Kidney small. Pel- vis dilated. Incision of pelvis. Stricture of ureter below exit. Division of stricture into pelvis. Pyelitis and cystitis persisted. One year later, nephrectomy.	...	.....	.....	.....	19
21	Kelly.	1897 (?)	35	F.	Stricture of ureter. Hydro- nephrosis for five years. Close to pelvis. Probab- ly calculus,	Stricture found close to pelvis. Strictured portion of ureter divided longitudinally and sutured transversely to pelvis.	...	.....	.....	.....	27

24	Delbet.	1898.	33	F.	Intermittent hydronephrosis for fifteen years.	Lumbar incision, stenosis, and oblique insertion of ureter. Division of ureter from pelvis through stricture (uretero-pyelo-neostomy).	.....	.....	.....	26
25	Albarra.	1898.	22	F.	Left pyonephrosis. Nephrotomy. Permanent ureteral catheter.	Lumbar incision. Extrapelvic division of spur. Extripation (capitonnage) of lower portion of sac. Suture of borders of ureter to pelvis.	.....	.....	.....	22
26	Albarra.	1898.	22	F.	Hydronephrosis. Stricture and oblique insertion of ureter. Stone in pelvis. Nephrotomy. Removal of stone.	Extrapelvic operation. Ureter incised. Opening in ureter united to opening in lowest part of pelvis.	.....	.....	.....	23
28	H. Morris.	1898.	29	F.	Stricture and valvular obstruction in upper end of ureter. Normal insertion.	Longitudinal ureterotomy. Division of stricture. Transverse union of ureter to pelvis.	.....	.....	.....	3
30	Fenger.	July 9, 1899.	41	F.	Intermittent infected hydronephrosis for ten years; left floating kidney.	Lumbar incision. Kidney large and elongated. Pelvis dilated. Oblique insertion of ureter, upper end bent. Incision of pelvis. Division of exit of ureter and pelvis. Transverse union.	.....	.....	?	19

*D.—Pyeloplastion.*

13	Israel.	1896.	39	F.	Intermittent hydronephrosis for six months. Pelvis dilated so that ureter originated from lateral side of wall. Ureter ran upward for one and one-half centimetres, then bent downward.	Incision of posterior wall of pelvis in direction of axis. No stone; no fold. Folding-in and suturing of medial side of pelvis (pyeloplastion). By similar folding-in of another part of pelvis, ureteral bend straightened. Nephropexy.	.....	.....	.....	11
26	Albarra.	1898.	22	F.	Hydronephrosis. Stricture and oblique implantation of ureter. Stone in pelvis.	Nephrotomy. Removal of stone. Pelvioplastion. Two months later, extrapelvic operation.	.....	.....	.....	23

TABLE OF OPERATIONS FOR RENAL RETENTION.—Concluded.  
 III. URETER.  
*A.—Ureterolysorthosis.*

Chronological No.	Operator.	Date.	Age.	Sex.	Disease.	Operation.	Result.				Bibliographical No.
27	Rafin (Verrillie).	Nov. 12, 1898.	32	F.	Left movable kidney, 1890. Intermittent left hydronephrosis, 1895. Nephropexy, April, 1896. Relief, then relapse.	Lumbar incision. Kidney small, lobulated. Pelvis dilated. Ureter sigmoid bend and inserted lower part of pelvis. Adhesions separated, and sigmoid bend straightened. Nephropexy November 12, 1899. No swelling of kidney since operation.	Recov.	Death.	Mucous Fistula.	Nephrectomy for Urinary Fistula.	28
11	Fenger.	Aug. 6, 1895.	32	F.	Probable traumatic right floating kidney, 1880. Recurrent attacks of pain, re-awakened after pregnancy in 1885. Returned in 1893 after miscarriage. Pyonephrosis. Tumor in region of right kidney.	<i>B.—Plastic Operation.</i> Pelviotomy. Removal of four stones from above valvular stricture. Longitudinal ureterotomy over and excision of stricture. Plastic operation on ureter.	.....	.....	.....	.....	29
29	Fenger.	May 23, 1899.	....	M.	Large left pyonephrosis, 1897. Lumbar nephrotomy. Ureterotomy. Removal of stone, one inch long, from upper end of ureter. Lumbar urinary fistula. Fenger's plastic operation on strictured ureter, 1898, by Dr. Allport of Chicago. Fistula persisted.	Isolation of kidney. Bisection. Stricture two inches below pelvis. Ureter isolated and found completely obliterated for one centimetre. Longitudinal ureterotomy one inch through stricture. Transverse union. Considerable tension on ureter. Bougies from kidney into ureter below stricture. Reunion of bisected kidney. Lumbar urinary fistula closed, and remains closed. January, 1900, osteomyelitis of humerus.	.....	.....	.....	.....	19

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THE APPENDIX IN RELATION TO THE PSOAS  
MUSCLE IN THREE HUNDRED MALE AND  
ONE HUNDRED AND EIGHTEEN FEMALE  
ADULT AUTOPSIES. TRAUMA OF THE PSOAS  
MUSCLE PRODUCES APPENDICITIS.

BY BYRON ROBINSON, M.D.,  
OF CHICAGO.

DURING the past fifteen years I have preserved detailed records of abdominal inspection in 300 male and 118 female adult autopsies. The bodies were taken just as they came consecutively. The sources of the material were Toledo Medical College, Cook County morgue, several Chicago colleges and hospitals, and private autopsies,—sources varied sufficiently to present accurate general views. No selections were made. A majority of the abdominal inspections were made through the professional courtesy of Professor L. Hecktoen, Drs. Le Count, Crowder, Edwards, and Wells, also the Cook County Internes.

The object of the investigations was the anatomy, physiology, and pathology of the peritoneum and its viscera. The observations and measurements were made without regard to results or any theory. The examinations were conducted by carefully observing every abdominal organ and its adjacent peritoneum. In this paper are recorded the observations of the appendix as regards its length, shape, position, meso-appendix in relation to the psoas (and other) muscles, with especial attention to peri-appendicular peritoneal adhesions. I have assumed the psoas muscle as a standard of reference for the position of the appendix and cæcum. After summing up in the careful notes taken in 418 adult cases, it becomes very plain that the psoas muscle may be taken as the standard of reference in regard to the appendicular position and peri-appendicular

adhesions. In fact, the pathologic condition of the appendix, cæcum, and distal ileum should be referred to the psoas, for 70 per cent. of peritoneal adhesions occurs in adults around the ileocæco-appendicular apparatus. The damaging traumatic action of the psoas on the appendix (cæcum and distal ileum) in man is one of the unfortunate conditions due to his erect attitude. Hence, the ileocæco-appendicular region I shall term a major region of peritonitis due to psoas muscular trauma (the other forms of major regions of peritonitis are the pelvis, gall-bladder, spleen, and mesosigmoid), each due to muscular trauma, except the infection added in the pelvic region by invasion from the oviducal pavilions. The cæco-appendicular apparatus was sketched at the autopsy, in almost every case, with special regard to the psoas muscle, as to whether it was on the muscle, or to the right of it, or in the potential position (enteronic area), or to the left of it (in the pelvis). All doubtful peritoneal adhesions were regarded as negative or normal. Hence, in this report of 70 per cent. of peritoneal adhesions around the cæco-appendicular (psoas) region, we are dealing with macroscopically demonstrable cases,—pathologic conditions visible to the naked eye. To me, at present, it seems amply evident that the factor which induces the 70 per cent. of peritoneal adhesions around the cæco-appendicular apparatus is the psoas muscle (and iliac), and that the frequency of appendicitis in man is due to trauma of the psoas muscle on the appendix. The appendix in man is much more frequently found in contact with the psoas muscle (46 per cent.) than in woman (20 per cent.). In the relation of trauma of the psoas muscle and the condition of the appendicular contents and the vitality of its walls lie an etiological factor in appendicitis. The subjects with appendicitis from trauma of the psoas muscle are liable to recover by medical or surgical treatment according as the perforation occurs in the colonic region, the benign area of peritonitis, or the enteronic region, the vicious area of peritonitis. If the appendicular perforation occur towards the middle of the abdomen, in the potential position or enteronic region, death usually results, as it is in the dangerous region of

lymphangitis. The trauma of the anterior abdominal muscles and diaphragm may produce appendicitis.

*The Appendix.*—The appendix is the fading remnant of an ancient herbivorous stomach. Its typical rests are in the wombat and man. In man it is practically functionless, hence its loss makes no known disturbance in his physical or mental economy. Being a fading remnant, its cells do not resist trauma or invading microbes. The cells of the appendix, being atrophic, rudimentary, non-vital, and non-resisting to trauma and infection, are unable to struggle and battle against life's invading forces, for it is defective in vital cells, in blood, lymph, and nerve supply.

*The Length of the Appendix.*—In 300 males, the longest appendix was seven and one-half inches, the shortest one inch, and the average three inches in length.

The average length of the appendix in 418 carefully recorded subjects was three inches, male and female alike.

The length of the appendix is a significant matter, as a long one is more liable to muscular trauma than a short one, and it may assume the potential or enteronic position, the dangerous or absorptive area of peritoneal lymphangitis. Also muscular trauma will induce plastic peritonitis on the appendicular walls, resulting in peritoneal bands which may produce appendicular kinks, ending in obstruction and retention. The danger of a long appendix over a straight, short one was frequently observed in the autopsies by numerous adhesions attached to its different segments. Sometimes it was free and lay on the left psoas muscle. The redeeming feature of a long appendix is that it nearly always possesses a long meso-appendix and a wide lumen, no kinks, which allows easy inlet and outlet to the faecal current, free drainage. In this long appendix it is common to observe considerable faecal contents in some of its segments. The long appendix is not only in danger of becoming fixed by peritoneal adhesions in some of its segments through muscular trauma (first, the psoas; second, the diaphragm, and third, the abdominal muscles), but occasionally peritoneal adhesions are found on the segment of the appendix

which lies within the traumatic range of action of the aorta or common iliac vessels. The vigorous contraction and dilatation (trauma) of the large arteries, when the appendix contains virulent microbes, induces migration through the mucosa, muscularis into the serosa, ending in plastic peritonitis and peri-

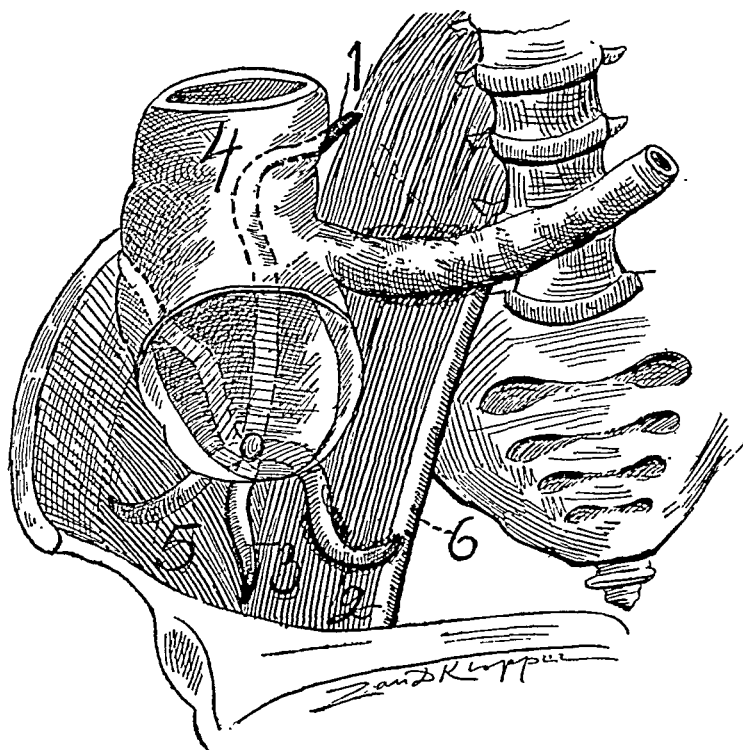


FIG. 1 illustrates the relative position of the appendix to the psoas (and iliac) muscles. It also shows a general position of the cæcum from the posterior surface of which arises the appendix. 1, Retrocæcal position of the appendix; 2, appendix resting on the psoas; 3, appendix resting at the junction of the ileopsoas; 4, right colon; 5, appendix resting on iliac muscle, and, 6, common iliac artery. Observe that ileum and appendix where they lie within range of the traumatic action of the psoas possess adjacent peritoneal adhesions. Also where the appendix tip or free end lies on the common iliac artery adjacent peritoneal adhesions exist, *i.e.*, if the appendix lies within the traumatic range of action of the artery (abdominal or common iliac); it may be surrounded by plastic peritoneal adhesions.

appendicular adhesions. A long appendix has a great area of mucosa to become damaged, and its walls are thin and easily perforated by invading bacteria. In general, the long appendix has thin tunics (mucosa and muscularis), and is apt to contain

faces. The short appendix has thick mucosa and muscularis, and is more apt to be spiral or kinked with obstructed lumen; finally, the dangerous appendix is the kinked or spiral.

*The Position of the Appendix.*—The position of the appendix owes its chief signification, first and foremost, to the patient. Is it located in the colonic area, the benign region of

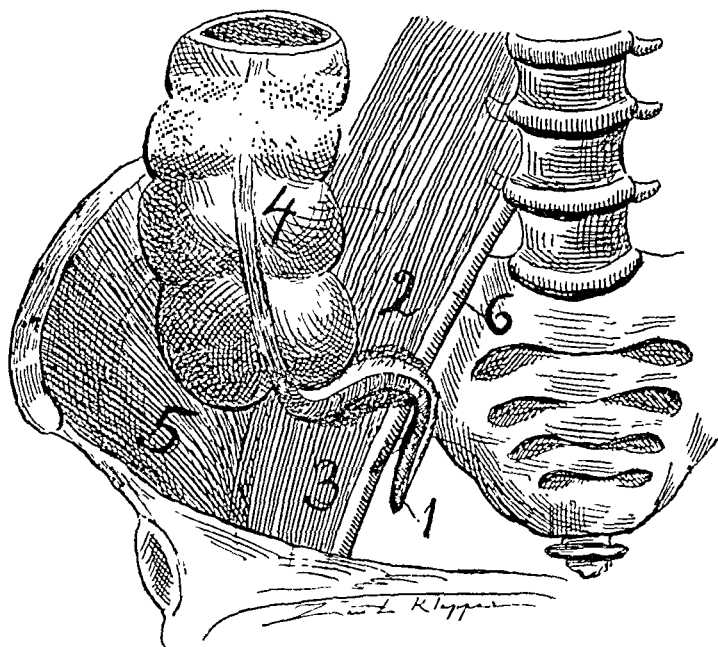


FIG. 2 illustrates the relative position of the appendix to the psoas and also extending into the lesser pelvis. 1, Appendix extending into lesser pelvis; 3, appendix resting on psoas; 4, colon; 5, iliac muscle, and, 6, common iliac artery. Observe that where the appendix lies within range of traumatic action of the psoas muscle and iliac artery that it is surrounded by peritoneal adhesions, that where the appendix extends into the lesser pelvis, free from any traumatic range of muscular or arterial action, it is not surrounded by peritoneal adhesions. Also observe that it is the vascular meso-appendix that first chiefly shows peritoneal adhesions, the less vascular mobile appendix presents adhesions the least. Muscular and arterial trauma produces peri-appendicular adhesions and appendicitis.

lymphangitis? Can it assume the potential position or enteronic region, the dangerous region of lymphangitis? In other words, will appendicitis produce peritonitis in the right (colonic area) or left side (enteronic area) of the mesenteron? Second, the position of the appendix is important to the surgeon to

indicate the location of the abdominal incision, for appendicitis is the most profound and treacherous of all abdominal diseases. The position of the appendix is the most variable of all the abdominal viscera. Like all late developed organs, its adult location is uncertain, halting at any point from the splenic flexure in its right circular journey to the pelvic floor. It

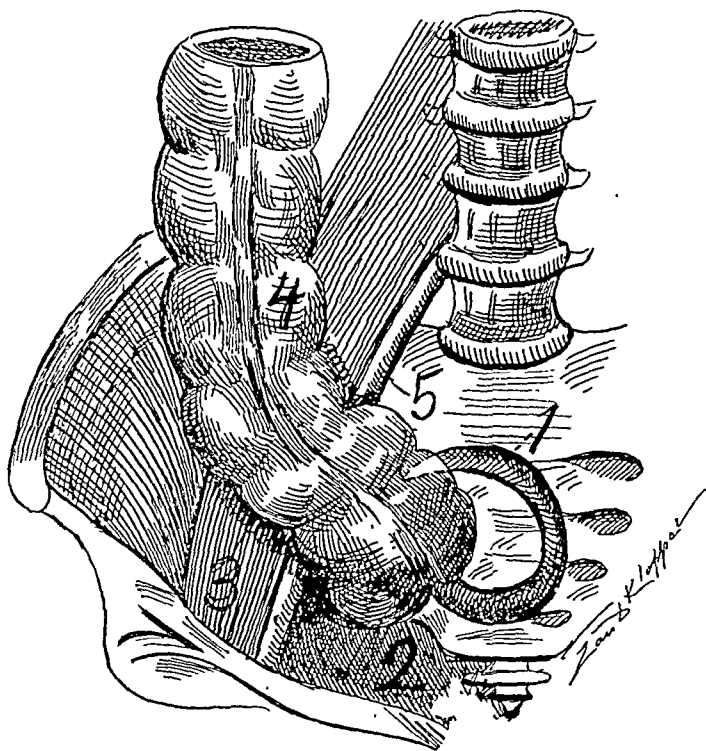


FIG. 3 shows the pelvic position of the appendix (accompanied by the pelvic position of the cæcum) and its relation to the psoas. 1, Appendix (no adhesions); 2, pelvic floor; 3, psoas; 4, right colon, and, 5, the common iliac artery. Notice that where the colon (any segment of the tractus intestinalis) crosses within traumatic range of muscular or arterial action it possesses adjacent peritoneal adhesions. Peritoneal adhesions from muscular or arterial trauma appear first in mesenteries and, second, in bowel segments.

may shift about daily through visceral movements, from an elongated fixation apparatus (mesocolico mesenteron); it may be made to touch any abdominal viscus or pass into any hernial ring. In general, the appendix will assume a position, viz. (1), on a line extending from the distal surface of the liver along the psoas muscle, over the right pelvic brim to the pelvic floor (colonic area); (2) the appendix may assume a position tend-

ing towards the centre of the abdominal cavity in the direction of least resistance (potential or enteronic position). This position will be among the enteronic coils due to an elongation fixation apparatus. In other words, the mesocolon from the cæcum to the right kidney as well as the distal mesenteron is usually long, allowing the appendix to float about in the abdominal cavity. When the appendix lies among the coils of the

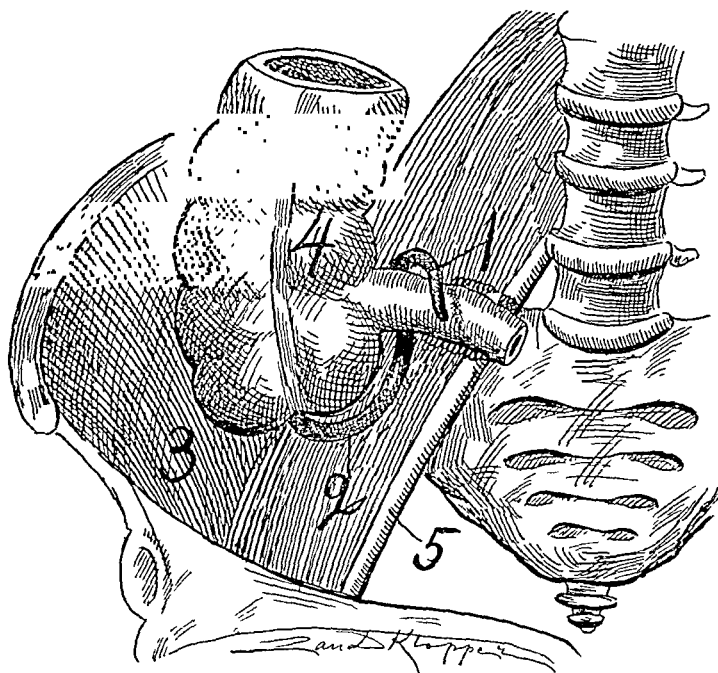


FIG. 4 illustrates the position of the appendix relative to the psoas (retrocæcal position). 1, Appendix passing proximalward (retrocæcal) posterior to the distal ileum; 2, appendix lying in right border of psoas; 3, iliac muscle; 4, colon, and, 5, common iliac artery. The segment of the ileum which lies within traumatic range of muscular or arterial action is surrounded by peritoneal adhesions. When the cæcum or appendix lies at the ileopsoas junction, it is frequently free from adhesions, as the range of muscular trauma is of a limited degree.

enteron (potential position), *i.e.*, to the left of the mesenteron, at the distal end of the ileum and proximal end of the colon, a kind of mesenterium commune exists. In the first position (colonic area) the appendix radiates from the line of the cæco-colon as an axis, like the spokes from the hub of a wheel. This appendicular radiation may occur at any point where the cæcum becomes fixed in its circular journey in the right side-



from the liver to the pelvic floor. The second position (potential or enteronic area) of the appendix will depend on the length of the mesocolico mesenteron (fixation apparatus). Many times in the above autopsies the appendix was located in the middle of the abdomen (or could assume that position), among the enteronic coils,—the dangerous area of peritonitis. But, fortunately, the trauma of the abdominal muscles on the

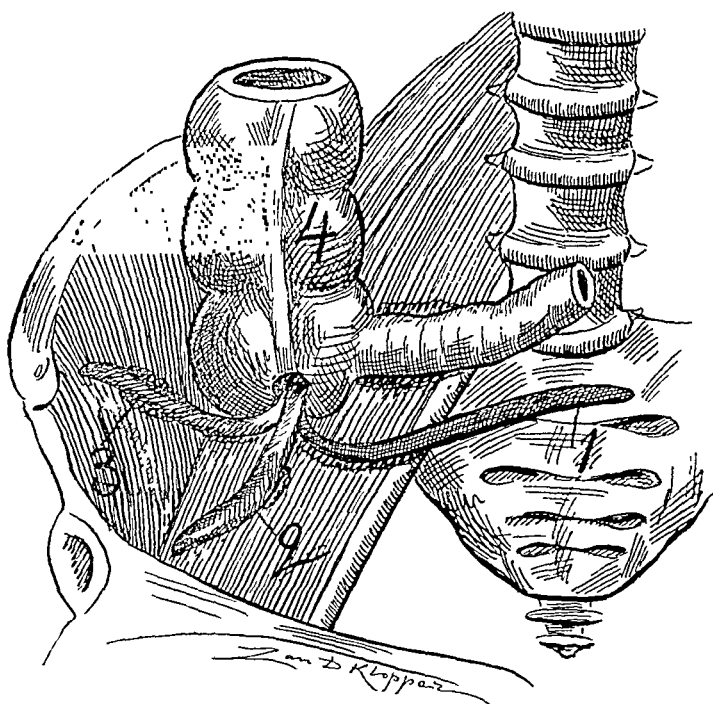


FIG. 5 illustrates a very common position of the appendix, cæcum, and ileum relative to the psoas. 1, The appendix lying parallel to distal ileum; 2, appendix lying parallel to psoas, pointing to Poupart's ligament; 3, appendix lying horizontal to ileopsoas and pointing to right iliac fossa. Ileum, within range of traumatic muscular and arterial action, surrounded by adhesions.

mobile appendix, when located in the midst of the enteronic loops, is insignificant to the vigorous and dangerous trauma of the psoas on an appendix more limited in mobility by a limited fixation apparatus, and hence unable to escape muscular trauma.

*The Location of the Appendix in 300 Males is recorded as follows:*

(1) The appendix extended "hung" in the pelvis, 37 per cent. (2) The appendix rested on the psoas muscle, 46 per

cent. (3) The appendix assumed the potential or enteronic position, 23 per cent. (4) The appendix was retrocaecal, 20 per cent. (5) The appendix was located to the right of psoas, 18 per cent.

(A) The appendix was located parallel to distal ileum, 14 per cent.

(B) The appendix was located transverse to iliopsoas pointing to iliac fossa, 7 per cent.

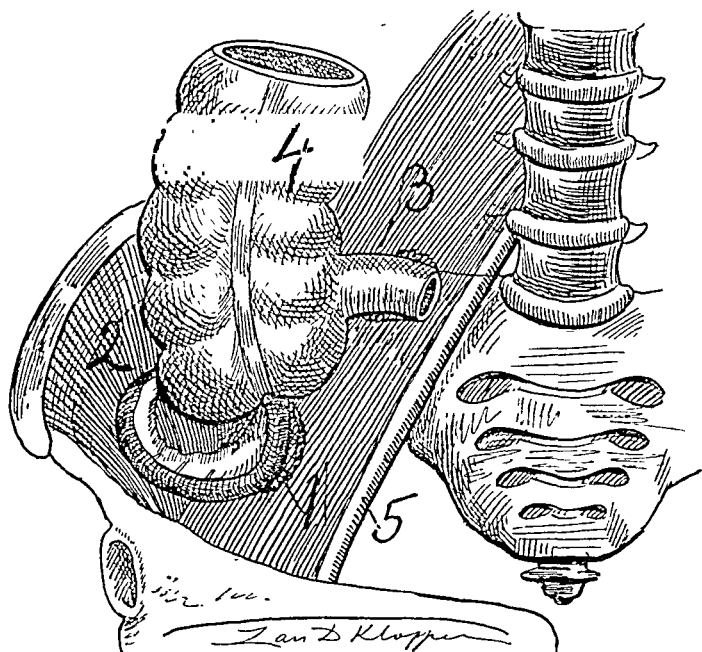


FIG. 6 illustrates the relations of the appendix to the ileopsoas muscle. Note that the ileum (3) and appendix (1), coming within the traumatic range of muscular action, possess peritoneal adhesions.

(C) The appendix was located parallel to and on the psoas (pointing to Poupart's ligament), 5 per cent.

(D) The appendix was in contact with the psoas, 52 per cent.

(E) The appendix assumed the colonic position, 80 per cent.

(F) The appendix could assume the potential or enteronic position (from fixation apparatus), 38 per cent.

*The Records of the 115 Adult Females are:*

(1) The appendix extended "hung" in the pelvis, 48 per

cent. (2) The appendix rested on the psoas muscle, 20 per cent. (3) The appendix assumed the potential position, 20 per cent. (4) The appendix was retrocæcal, 35 per cent. (5) The appendix was located to right of psoas, 28 per cent.

(A) The appendix was located parallel to distal ileum, 15 per cent.

(B) The appendix was located transverse to iliopsoas (pointing to iliac fossa), 6 per cent.

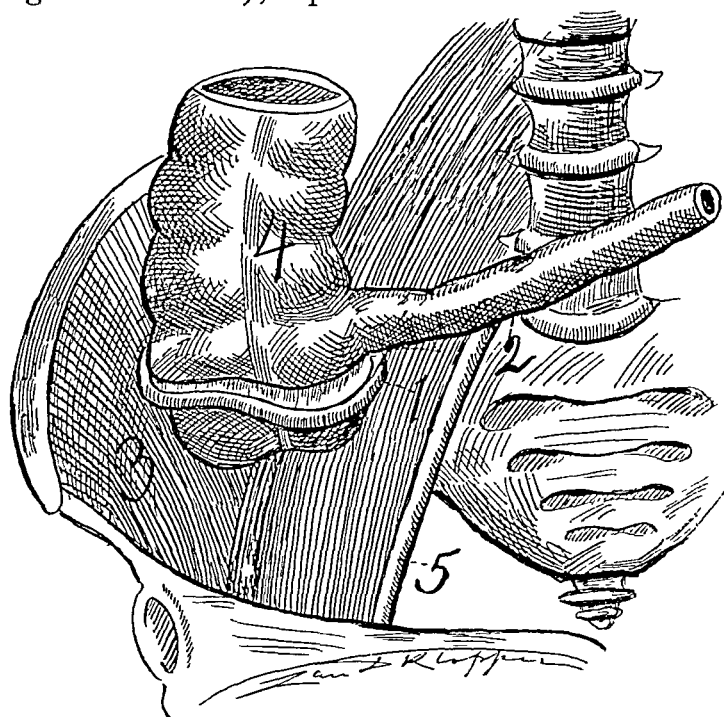


FIG. 7 illustrates a position of the appendix relative to the psoas. Here the appendix passes anterior to the cæcum, and is not within traumatic range of action of muscle and artery, hence, no peritoneal adhesions appear. 1, Appendix; 2, ileum; 3, iliac muscle; 4, right colon; 5, common iliac artery.

(C) The appendix was located on and parallel to the psoas (pointing to Poupart's ligament), 6 per cent.

(D) The appendix was in contact with the psoas, 32 per cent.

(E) The appendix assumed the colonic position, 80 per cent.

(F) The appendix could assume the potential position (from its fixation apparatus), 30 per cent.

There are two general positions of the appendix to con-

sider, viz., (1) the colonic (benign area of peritonitis), about 80 per cent., and (2) the potential enteronic (or dangerous area of peritonitis), about 20 per cent. The signification of recovery from perforated appendicitis frequently depends on in which area, colonic or enteronic, the disaster occurred. The colonic area is an area of peritonitis and not of absorption.

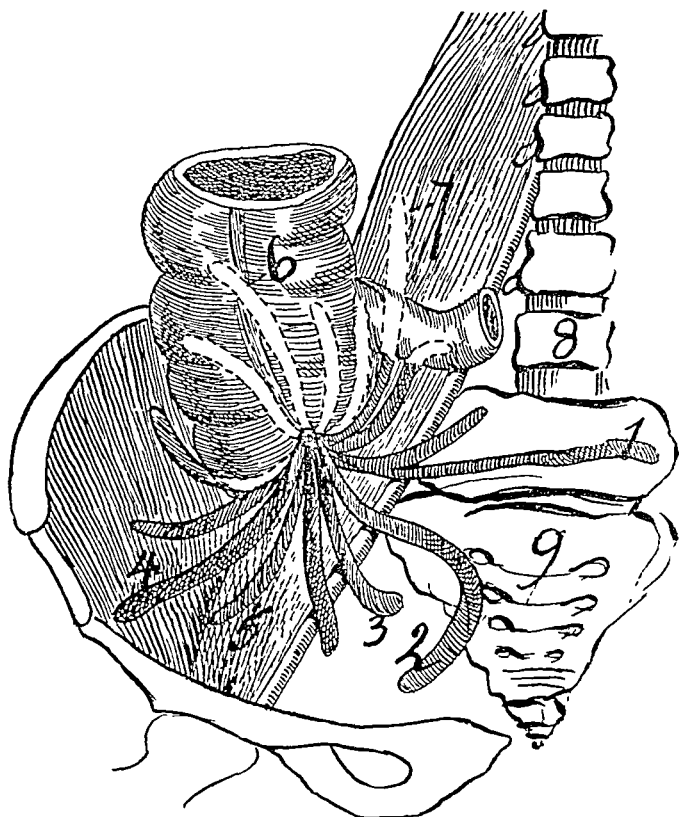


FIG. 8 illustrates the numerous positions of the appendix relative to the psoasiliac muscle. 1, Appendix parallel to distal ileum; 2 and 3, appendix in pelvic position; 4, appendix resting on iliac; 5, appendix resting on psoas; 6 and 7 represent retrocaecal positions of the appendix. The appendix radiated like the spokes of a wheel, from the caecocolon as an axis.

The enteronic area is an area of absorption and not of peritonitis. In other words, the stomata vera in the colonic area are limited in number, and hence absorption is limited. The stomata vera in the enteronic area (also diaphragmatic) are vast in number, and hence is an area of absorption and not of peritonitis. Peritonitis saves life, while absorption (sepsis)

kills. In the position of the appendix there are two points to consider, viz. (1), Its *origin*, which is the posterior and inner part of the cæcum. This corresponds to a point midway on a line drawn from the umbilicus to the anterior iliac superior spine (McBurney's point), which merely indicates a symptom of pathology by producing pain on pressure. The position of

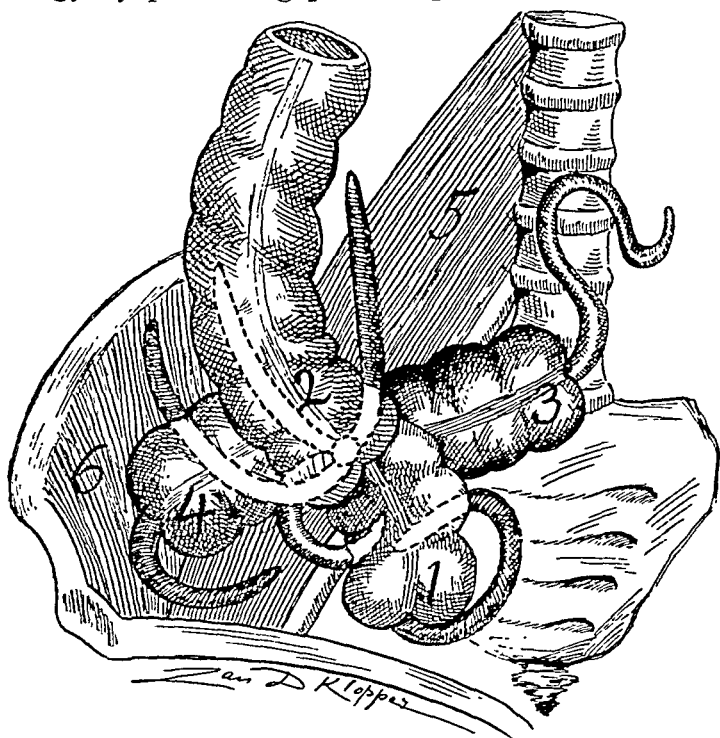


FIG. 9 illustrates the five major positions of the appendix (and the four major positions of the cæcum) in relation to the psoas. 1, The pelvic position of the appendix; 2, the retrocæcal position of the appendix; 3, the potential (enteronic position of the appendix); 4, the appendix to the right of the psoas (chiefly); 5, the appendix lying on the psoas and common iliac. No adhesions are marked adjacent to the appendix in any of the five positions. The four major positions of the cæcum in relation to the psoas are: 1, Cæcum in the pelvis; 2, cæcum on the psoas; 3, cæcum in the potential position; 4, cæcum to the right of the psoas. No adhesions are drawn adjacent to any cæcal position.

the insertion of the appendix in the cæcum varies with the extremely variable position of the cæcum itself. (2) The position of the *free extremity* of the appendix and its relations with neighboring organs—colon, enteron, liver, genitals, and omentum—is of the most variable character.

In my 500 adult autopsies inspections of the abdomen the

odd places in which the appendix was found were (a) distal to and in contact with the liver; (b) lying on the pelvic floor; (c) free end on the left side of the lumbar vertebral column; (d) lying among the enteronic coils; (e) lying on the kidney;

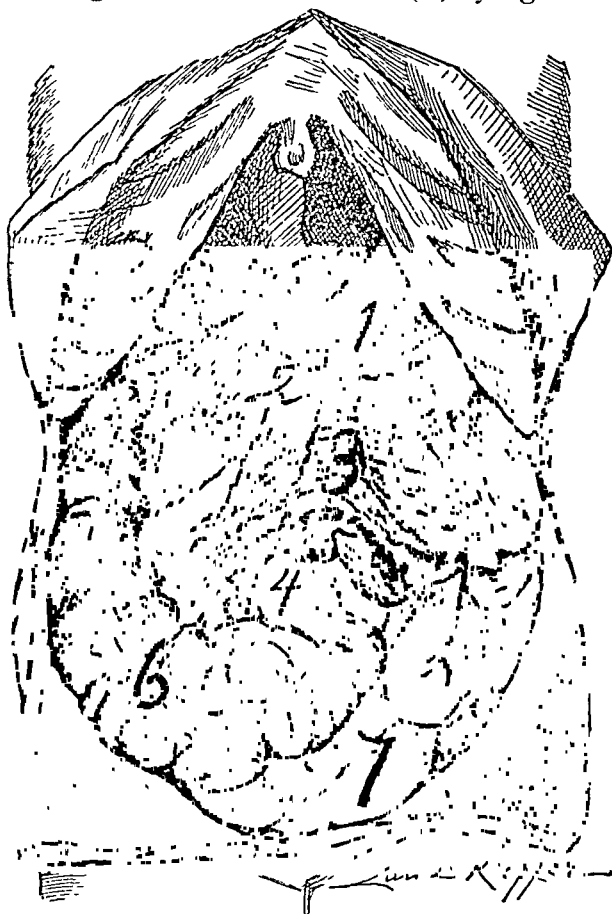


FIG. 10 illustrates a subject with the appendix (and cæcum) in the potential position, *i.e.*, among the coils of the enteron, the dangerous area of peritonitis. By contraction and dilatation of the cæcum, the omentum has been thrown off the appendix. Unless the omentum be on hand when the appendicular rupture occurs among the enteronic coils to control the infection, death is almost always the result. 1, Stomach; 2, omentum on transverse colon; 6, omentum colicum; 5, appendix; 4, cæcum (both uncovered by omentum); 7, coils of enteron.

(f) the free end lying on the left psoas muscle; (g) in non-descended cæcum the appendix might lie distal to the middle of the liver immediately to the left of the vertebral column; (h) the appendix was found directly in contact with the anterior ab-

dominal wall from the anterior iliac spine to the umbilicus; (i) lying against the lesser pelvic wall. To show that the appendix may shift its position, in a number of cases (potential position of the appendix) I could make the tip of the appendix touch



FIG. 11 illustrates a subject with the omentum reflected proximalward over the chest. The cæcum and appendix both occupy the potential position, *i.e.*, among the coils of the enteron, being the dangerous area of peritonitis (the colonic area is the benign area of peritonitis). 1, Reflected omentum; 2, colon transversum; 3, coils of enteron; 4, cæcum; 5, appendix; 6, right colon; 7, coils of enteron between cæcum and right colon.

every abdominal viscus. The extremely variable position of the free end of the appendix explains why purulent collections of appendicular origin do not always occupy the same locations, since the appendix may and can rupture in any one of its

numerous situations. The appendix is an organ subject in position to (a) condition of adjacent viscera and (b) to the muscular walls of the abdomen. (a) The distention and contraction of the segment of the tractus intestinalis, tractus genitalis, and tractus urinarius make the position of the appendix a variable one. The most remarkable variation in appendicular position is produced by visceral distention in the genitals

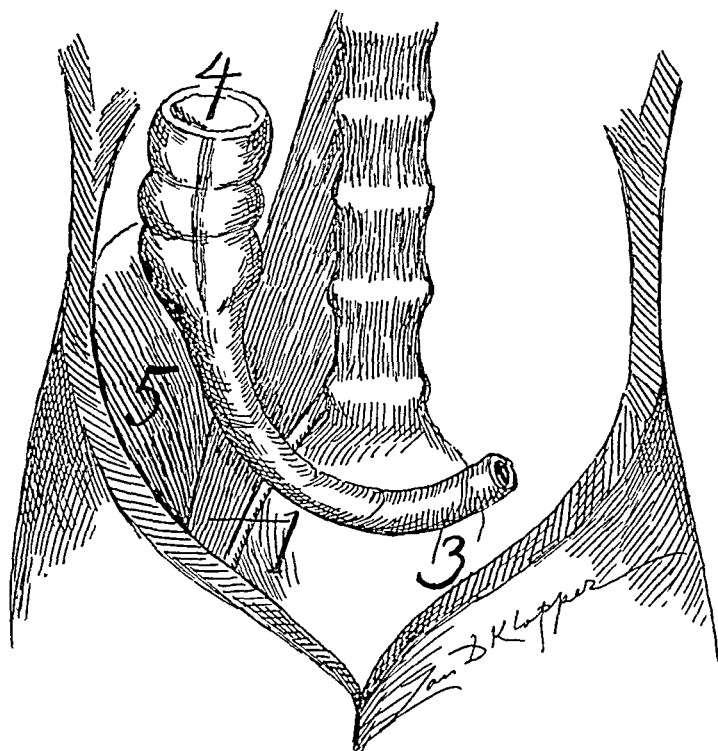


FIG. 12.—This remarkable case of congenital absence of the cæcum and appendix was from the body of a female aged fifty years, and was the only subject with the absence of the appendix and cæcum in 418 cases. 1, Psoas; 3, ileum; 4, right colon; 5, iliac muscle. The subject was otherwise normal. No peri-iliac adhesions over psoas.

(uterus), bladder, cæcum, enteron, sigmoid, and colon. The appendix may have widely variable daily positions depending on the state of distention of adjacent hollow viscera. The distending hollow adjacent viscera alter the position of the appendix with or without trauma. (b) The muscular apparatus of the abdominal wall changes the appendicular position to a limited degree only. The distinct alteration of the appen-



dix through muscular action is generally through violent trauma; when the muscular trauma acts on the appendix (or any segment of the tractus intestinalis, tractus genitalis, or tractus urinarius) containing virulent microbes, it induces the migration of germs or their products through mucosa, muscularis into the serosa ending in plastic peritonitis. The physiologic condition of any abdominal organ is free mobility, not fixation. The appendix in its varying position, caused by vis-

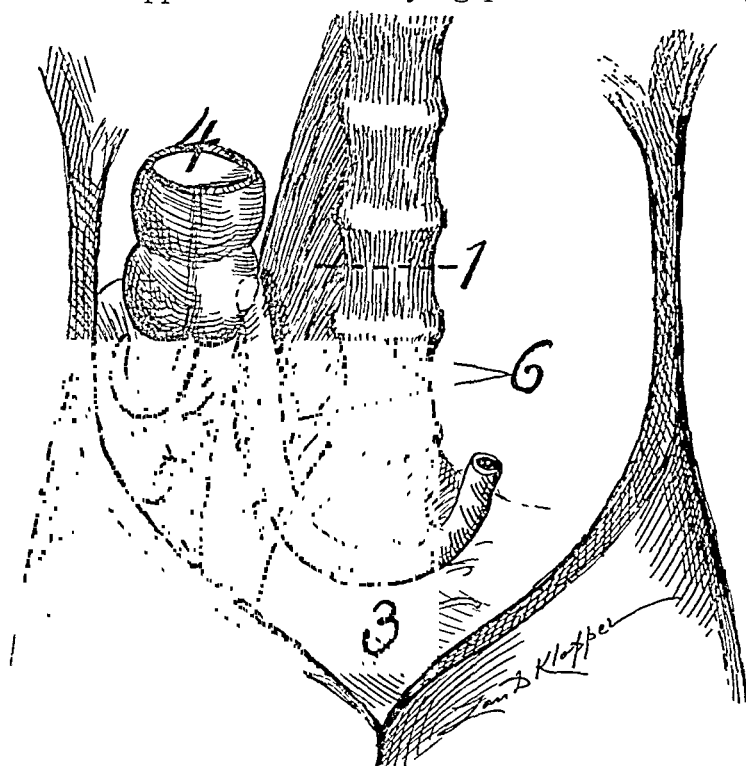


FIG. 13 represents a case of non-descended caecum (and appendix). Some three inches of distal ileum are required to extend from the psoas to the non-descended caecum. 1, Psoas; 2, appendix; 3, ileum; 4, right colon; 5, iliac muscle, and, 6, peri-iliac adhesions.

ceral distention and muscular activity, may become accordingly fixed from adjacent or peri-appendicular adhesions, whence it immediately possesses a pathologic position,—fixed,—as it is compromised in vascular and faecal circulation and traumatized in nerve periphery besides damaged in nourishment.

To the irregular growth of the caecum must be credited the appropriation of a part or nearly all of the meso-appendix

to cover the cæcum. The cæcum and ascending colon grow out of proportion to their peritoneal covering, so that adjacent peritoneum must be pressed into service to cover the distending bowel. The meso-appendix is the first and easiest portion of the peritoneum to appropriate and to cover rapidly expanding cæcum. Little by little the growing cæcum separates the blades of the meso-appendix to clothe itself, and gradually the appendix is drawn against the cæcum and right colon, the appendix

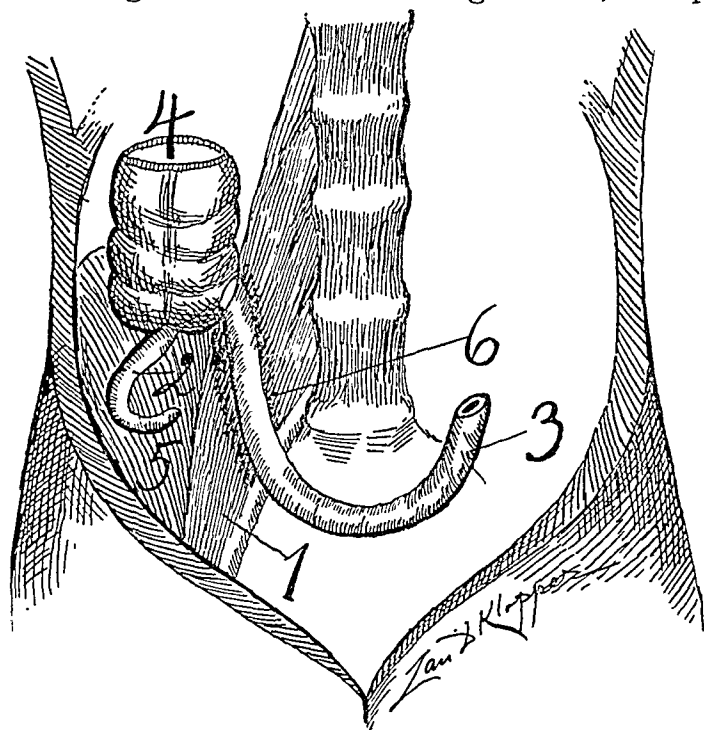


FIG. 14 represents a frequent form of non-descended cæcum (and appendix). 1, Psoas; 2, appendix; 3, ileum; 4, right colon; 5, iliac muscle, and, 6, peri-iliac adhesions where ileum crosses psoas.

becoming more spiral, sufficiently to lie parallel against any portion of the cæcal surface, but especially the posterior. It may lose nearly every vestige of its meso-appendix, and ultimately become almost straight, losing the spiral condition due to the meso-appendix. In such cases the appendix minus the meso-appendix lies parallel and applied to the posterior cæcal surface, and occasionally this condition extends to the surface of the right colon. So far as the records of the 418 cases are

concerned, wherever the appendix becomes applied to the cæcal (colonic) surface some abnormal condition seemed to exist in the meso-appendix, perhaps an intra-uterine peritonitis existed, checking the growth and movement. An excessive local cæcal development, due to the irregular blood supply or the blood supply to the appendix and distal end of the ileum becomes locally disturbed. When the appendix lies parallel to, and fairly closely applied to, the cæcum, with a limited meso-appen-

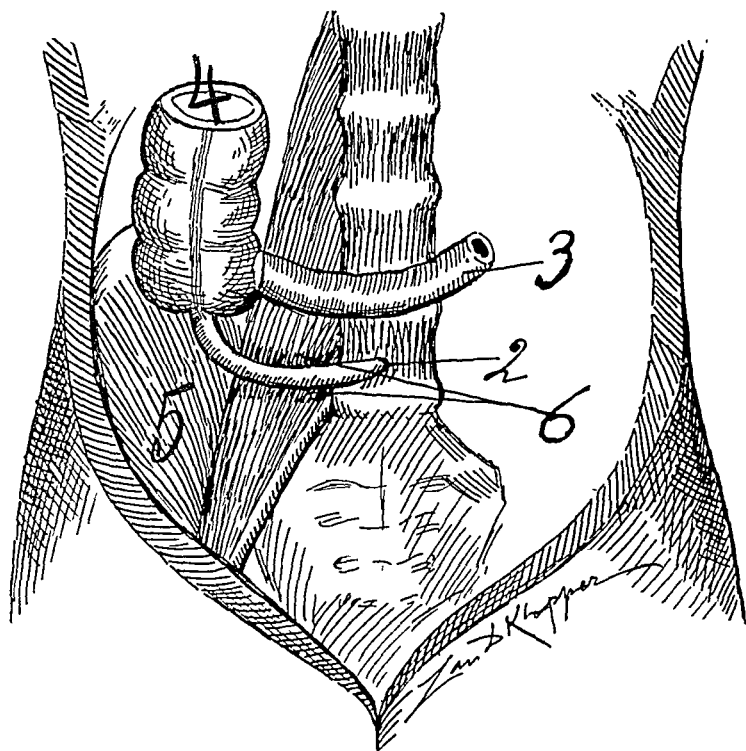


FIG. 15 illustrates a form of non-descended cæcum more frequent than Fig. 14. 1, Psoas; 2, appendix possessing peri-appendicular adhesions, 6, where it crosses the psoas; 3, ileum (no peri-iliac adhesions, as it is out of the range of action of the psoas); 4, right colon; 5, iliac.

dix, it shows that the serous covering adjacent to the cæcum has been distinctly disturbed, and in so doing has drawn its appendix irregularly out of its natural position. However, the most spiral appendix is the one lying close to, but not applied to, the left half of the cæcum. The position of the appendix, vertically behind the cæcum, with separated meso-appendix blades to cover its expanding surface, accounts for the many

perforations of the appendix with pus formation and reperforation into the cæcum or right colon. No peritoneum on either appendicular or cæcal wall exists, uncertain segments to resist the invasion or to extend the inflammation, and thus perforation is facilitated. The position of the appendix is a significant matter medically and surgically.

*The Direction of the Appendix.*—As regards the direction

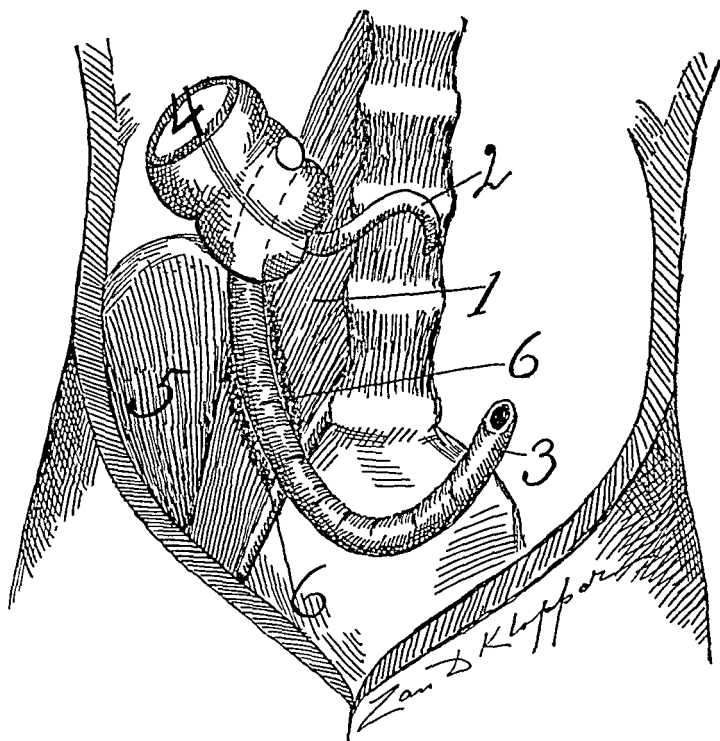


FIG. 16 illustrates a partially descended cæcum and appendix. The appendix can assume the potential position from the presence of an elongated mesocolico mesenteron, and there is a volvulus of one-half rotation (180 degrees). 1, Psoas; 2, appendix; 3, ileum; 4, right colon; 5, iliac muscle, and, 6, peri-iliac adhesions, where ileum crosses long range of traumatic action of psoas.

that the appendix points, developmental process shows that it points in general proximalward and towards the left. The two organs towards which it practically points are (a) the spleen, (b) the liver. The vascular vicissitudes to which the appendix is subject in development insures great variation in position and direction. It pointed to the spleen in some 20 per cent.,

towards the liver, 14 per cent. It pointed towards the right iliac fossa in females, 16 per cent.; in males, 7 per cent. It was directed towards Poupart's ligament in females, 10 per cent., in males, 7 per cent. It frequently passed proximally posterior to the distal end of the ileum and pointed towards the centre of the diaphragm. It often assumed irregular and uncertain directions on account of incomplete or excessive descent of the cæcum. Its direction depends very much on the length and character of the meso-appendix. The uncertain end-

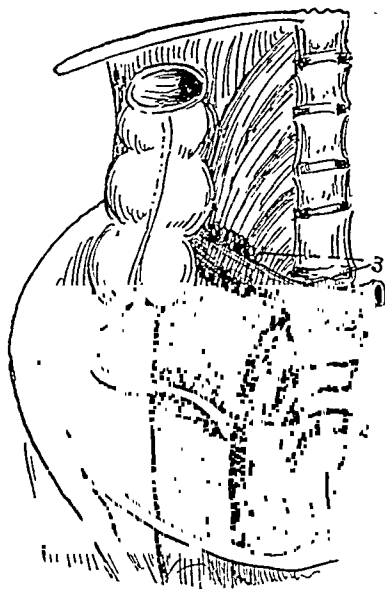


FIG. 17 illustrates a cæcum not fully descended. The long appendix is practically descended. It is another type sketched from a subject where the ileum, 3, and the appendix, 2, come within range of action of the psoas. The cæcum is free from adhesions, though it lies on the iliac muscle, because the range of the iliac muscle is insignificant in action.

ing of the ileum in the right iliac fossa, and the variation in shape, position, and arrangement of the ileocæcal apparatus, multiplies the variation in the direction of the appendix. The direction of the appendix is important to the patient and surgeon. Its direction proximally posterior to the right of the cæcum is comparatively safe. Its direction in the enteronic area or posterior to the left side of the mesenteron is in the dangerous grounds, as it may perforate in this locality. The location of the appendix is more important than the direction;

however, if contracting bands kink it, retention may follow. In many subjects the appendix assumes a spiral direction by reason of irregular traction of the meso-appendix. In some of the cases with strongly spiral appendix, in order to straighten it out, the meso-appendix required severing. The

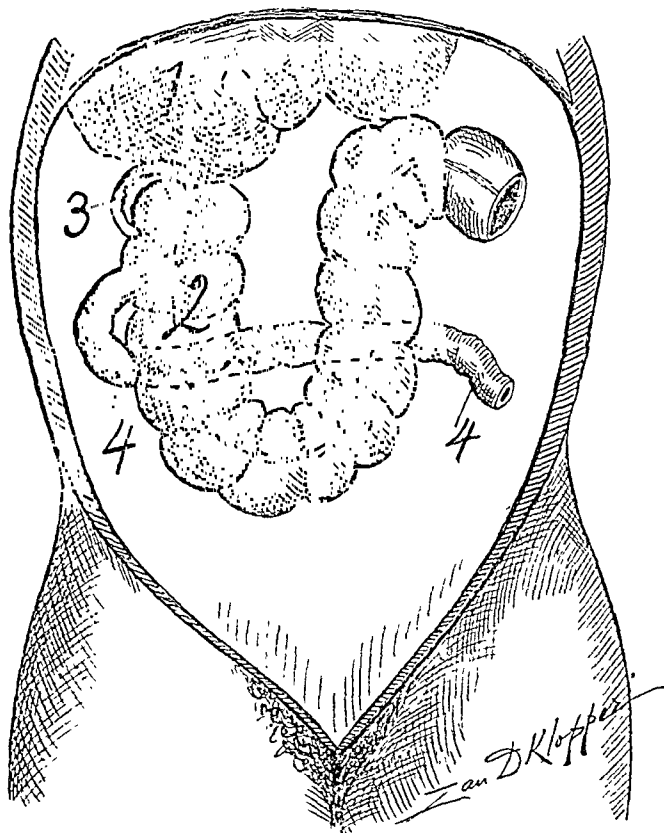


FIG. 18 illustrates non-descent of caecum and appendix, with partial volvulus of ileocolic apparatus about the right colon as an axis. It appears that an intra-uterine peritonitis arrested the caecum about the gall-bladder, but the growing colon moved onward in a loop, in the direction of the least resistance towards the iliac fossa. 1, Liver; 2, right colon; 3, caecum; 4, ileum entering colon from right side and passing posterior to it. Not infrequently such non-descended caecum and appendix are potential in position, *i.e.*, an elongated mesocolico mesenteron will enable them to float about in the abdominal cavity.

appendix, which is strongly spiral, may become easily kinked, resulting in pathologic retention, especially in this case, when some segments, or the whole appendix, are fixed in adhesions.

I shall designate for practical purposes in relation to the

psoas five positions of the appendix, viz., (1) Pelvis, (2) Resting on psoas, (3) Retrocæcal, (4) To the right of psoas, (5) The potential position. The appendix assumes numerous positions (colonic area) as it radiates from the axis of the cæcocolon.

*The Pelvic Position* (females, 48 per cent.; males, 37 per cent.).—The pelvic position is the first major position of

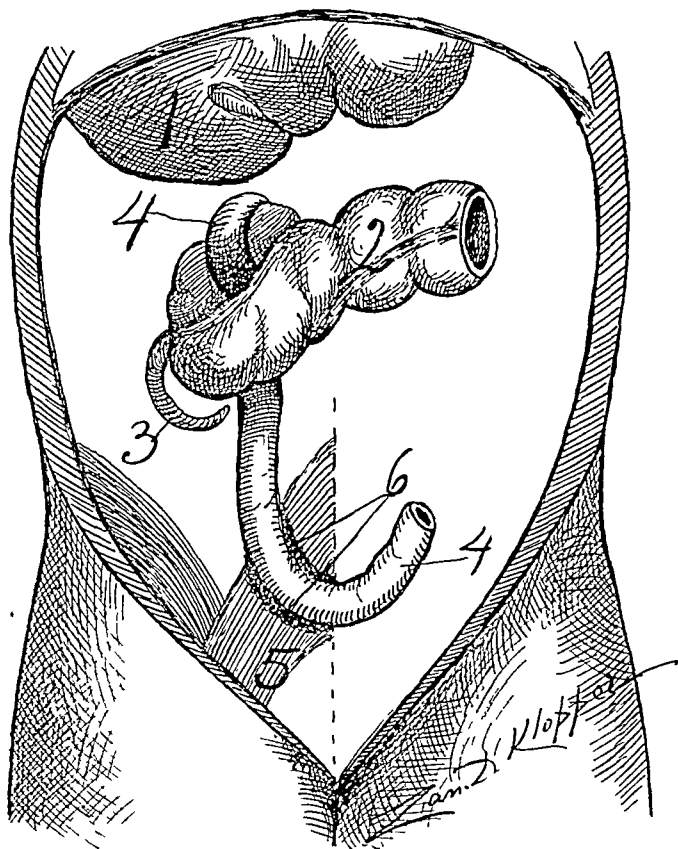


FIG. 19 illustrates non-descent of cæcum and colon, with volvulus of ileo-cæcum about the right colonic axis. 1, Liver; 2, right colon; 3, appendix; 4, ileum; 5, psoas; 6, the segment of the ileum which crosses the psoas is surrounded by peritoneal adhesions.

the appendix. What is here meant by the pelvic position, the appendix hanging or extending into the pelvis, is that a part or the whole of the appendix passes distally over the pelvic brim. The appendix chiefly hung over or embraced the margin of the psoas. The extension of the appendix distalward into the pelvis contributes to its safety. The appendix does

not travel to its final home perhaps until two years after birth. Hence, the topography of the appendix can be worked out on the adult only. I am aware of no literature giving special labor on the topography of the appendix and cæcum.

In 300 males, the appendix extended into the pelvis 37 per cent., and 21 per cent. of the appendices in the pelvis showed peritoneal adhesions. In 118 females the appendix extended into the pelvis 48 per cent., and 27 per cent. of the appendices in the pelvis showed peritoneal adhesions. There

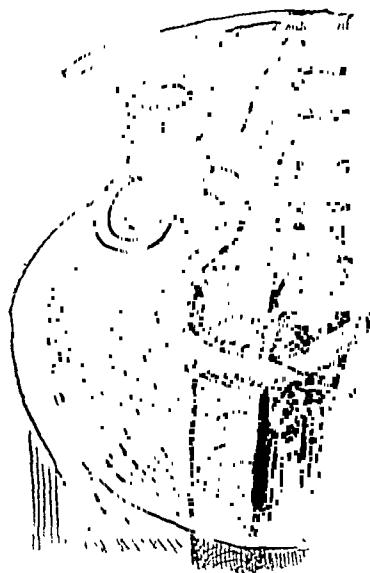


FIG. 20.—Non-descended cæcum and appendix requiring five inches of ileum to reach from psoas to cæcum illustrate well that any bowel structure which crosses the middle of the psoas is liable to have exudates around it. Here the cæcum and appendix are non-descended and entirely out of range of the psoas muscle, with no adhesions about them. But the ileum, 3, where it crosses the psoas, had adhesions on both sides of it.

exist 6 per cent. more peritoneal adhesions about the appendix lying in the female pelvis than in the male pelvis. One would naturally expect more. These appendices lying in the pelvis are, or may be, of the potential position, frequently shifters, and hence may have acquired the peri-appendicular adhesions while wandering within the range of traumatic action of the psoas or levator ani. The pelvic position of the appendix comprises two ideas, with two different scenes, viz., (1) the pelvic



position of the appendix may consist simply of the cæcum resting on the psoas, with a long or short appendix extending more or less in the lesser pelvis. In such cases the basal part of the appendix which lies on the psoas is generally surrounded by appendicular peritoneal adhesions, while the free end of the appendix extending into the lesser pelvis is generally entirely free from peritoneal adhesions. Relatively, seldom do such appendices rupture, except the basal end be compromised by adhesions where it lies on the psoas; (2) the pelvic position of the appendix may consist of a complex condition consisting of the excessively developed cæcum with elongated mesocolico mesenteron and distal end of the ileum all lying in the lesser pelvis. In other words, the ileocæco-appendicular apparatus has passed distalward beyond the pelvic brim into the lesser pelvis. Fortunately, this condition (pelvic appendicular position) conduces to the safety of the appendix by taking it out of the range of traumatic action of the powerful psoas and placing it within the range of the traumatic action of the less powerful levator ani, however the frequently infected oviducal pavilion introduces here a new element of danger. When the appendix lies in the lesser pelvis accompanied by the cæcum, distal end of ileum, and elongated mesocolico mesenteron, it may assume at any time a potential position and wander about through dilatation and contraction of the cæcum, or adjacent viscera, or intra-abdominal pressure, especially during advanced gestation, but fortunately an elongated fixation apparatus allows the appendix to glide to the central abdominal space out of range of dangerous muscular trauma. In the pelvic position of the appendix where it is accompanied by the cæcum (females 20 per cent. (in 118), and males 10 per cent. (in 300), the fixation apparatus (mesocolico mesenteron) is elongated, and endows the appendix with a wide range of motion induced by distention and contraction of adjacent viscera, as sigmoid, bladder, uterus, stomach, and enteron. The pelvic position (colonic area) of the appendix, when accompanied by the cæcum, may through distention of the bladder, sigmoid or uterus (tumors) elevate or force the

appendix proximalward into the enteronic arch, *i.e.*, from a practically safe area (pelvic, colonic) to the dangerous area (enteronic). With an elongated mesocolico mesenteron, as frequently arose in the autopsies, I could make the appendix touch every organ in the abdomen. Careful study of the pelvic appendicular position in the male (37 per cent. in 300) demonstrated that it was very significant only when the appendix extended to the pelvic floor and resided within traumatic muscular action of the levator ani. This was very seldom, and occurred with adjacent appendicular peritoneal adhesions practically but a few times in the 300 males. The traumatic muscular action recorded in the dilatation and contraction of the bladder on the appendix while in the pelvis should not be overlooked.

In the pelvic position of the appendix in females, 48 per cent. in 118, exists vast importance medically and surgically. An anatomical fact well to remember, is, the appendix extends more frequently distally in females than in males. The wide pelvis of females, as well as the abdominal cavity being cone-shape or the widest distally, aids in allowing the appendix to gain the pelvic floor within the traumatic action of the levator ani adjacent to the oviducal pavilion. Also the cæcum resides in the pelvis in females (20 per cent.) twice as often as in males (10 per cent.). In females, the wide distal abdominal cavity, the wide pelvis, the accumulation of fæces, gestation and expulsion, and the active visceral ptosis of female life aid in forcing the cæcum and the appendix against the pelvic floor, against the levator ani. (1) The muscular trauma of the levator ani will cause appendicitis by inducing virulent germs to invade the mucosa, muscularis and serosa of the appendix. The appendix being an atrophying organ, its cells are devitalized. They have a deficient blood and lymph supply, a defective nerve supply, the mucosa muscularis is compromised from waning nourishment. Hence the cells of the fading appendix do not resist the invasion of germs nor well withstand the conflict of life-opposing forces. Muscular trauma on other segments of the bowel (cæcum, distal ileum, sigmoid, and trans-

versum duodenum) produce plastic peritonitis only, seldom ulceration, and almost never perforation, because said bowel segments have ample drainage and resistance. But the non-resistance of the devitalized atrophic cells of the appendix can neither withstand virulent germs nor muscular trauma. The same sad story may be told of all other fading organs or rests, as the parovarian, the branchial clefts, Meckel's diverticulum, the urachus, the remnants of the mesonephros in the mesosalpinx and the myometrium and the thyroid duct. (2) The muscular trauma, bladder, rectum, uterus, and sigmoid will aid to induce appendicitis and pelvic peritonitis by hastening microbic invasion from the pavilion of the oviduct through contraction and dilatation from passage of gas and fæces. (3) Muscular trauma of the levator ani will induce and hasten the passage of microbes from the pavilion of the oviducts. With the pelvic appendicular position there exists in the female pelvis three important factors which aid in inducing appendicitis, viz., (a) infection from the pavilion of the oviducts, (b) muscular trauma of the levator ani, and (c) muscular trauma of the rectum, bladder, and sigmoid (contraction and dilatation). The levator ani is a powerful agent in muscular trauma. It has a wide range of action. The levator ani has a strong fascial layer proximally (levator ani fascia superior) and a strong fascial layer distally (levator ani fascia inferior). It is unlike other muscles; it is doubly strengthened by fascial layers above and below, something unique in muscle arrangement. To observe its powerful and extensive action one has only to note the action of the pelvic floor of the female patient while coughing under an anæsthetic. It has a two-inch range of action. Under such active muscular trauma, if there be virulent germs either in the appendix or oviduct, they are liable to invade the appendicular wall or the pelvic peritoneum from the oviducal pavilion. This view is a practical matter among experienced gynæcologists. I have noted in my gynæcologic work about 65 per cent. of pelvic peritonitis on the left side and about 35 per cent. on the right side. This is doubtless due to the muscular trauma of the levator ani, pyri-

formis, the rectum, bladder, and sigmoid (contraction and dilatation) affecting the left oviduct more than the right on account of the closer proximity of the oviduct to the rectum.

Again, when the appendix lies within the range of traumatic muscular action with adjacent peritoneal adhesions over vascular areas containing large vessels (lymph and veins), it is macroscopically evident that these veins are infected in the perivascular and lymph spaces. The peritoneum is white, with a sclerotic characteristic dull color. This sclerotic peritoneal area of old peritonitis frequently extends from the appendix with its adjacent adhesions to the pavilion of the oviduct, adjacent to which are areas of old peritonitis. The ligamentum infundibulo pelvicum has been distinctly inflamed, leaving a peritonitic residue, thickened peritoneal deposits, (*a*) the residual peritonitis in relation to the appendix and oviducal pavilion indicates that in the vast majority of cases the peritonitis began at the oviducal pavilion and spread towards the appendix. Also the pavilion of the oviduct is frequently found within the range of traumatic muscular action of the psoas, as is the case in foetal and childhood life. When the oviducal pavilion can be traumatized by the muscular action of the psoas, peritoneal adhesions may be found adjacent to the pavilion, and if the appendix be found adjacent to the pavilion, also peritoneal adhesions may exist adjacent to it. Although I can find no distinct peritoneal fold connecting the meso-appendix and ligamentum latum, yet in many cases the appendix and pavilion were intimately associated, and past peritonitis was evident about both organs.

The appendix when in the pelvis may shift about as well as the oviducal pavilion. But when the pavilion and appendix lie closely adjacent to each other, and especially if both be within range of traumatic muscular action of the psoas, either pelvic peritonitis or appendicitis through germs escaping from the pavilion will probably exist; endosalpingitis in the oviducal pavilion may infect the mucosa of the oviducal pavilion, both producing peritonitis, which compromises circulation and function and traumatizes nerve periphery. I have noted clini-

cally the close relation between the right pelvic peritonitis and appendicitis, and also the difficulty of differential diagnosis.

The abdominal post mortems have demonstrated the actual pathologic facts. Endosalpingitis may induce appendicitis indirectly by infecting the peri-appendicular and meso-appendicular serosa, producing irregular plastic adhesions which compromise the fæcal and vascular circulation as well as the nourishment of the appendix, by distortion and dislocation of its parts. Peri-appendicular and meso-appendicular peritonitis, with resulting contracting, cicatricial adhesions, produces frequently bending or kinking of the appendix,—a deadly factor in the etiology of appendicitis. The records of autopsic abdominal inspection in the 118 females, besides my experience in about 100 unrecorded autopsic abdominal inspections of females as well as many hundred personal cœliotomies, have served to convince me of the intimate relation between genital and appendicular diseases. The medium of communicating disease from genital to appendix, or *vice versa*, may be direct or indirect infection. However, in the vast majority of cases the medium of communication of infection is indirectly through peritoneal lymph apparatus by means of peritoneal cicatricial adhesions which compromise the fæcal and vascular circulation and nourishment of the appendix. The irregular cicatricial contraction of peritoneal adhesions adjacent to the appendix fix it into angles and curves, thus making it a prey to muscular trauma and bacterial invasion of its walls with limited drainage. Frequently the ligamentum infundibulo pelvicum was so short that it held the pavilion within range of traumatic muscularis action of the psoas, and from the pavilion of the oviduct on either side of the pelvis the lymphangitis would spread proximalward and distalward on the psoas. The lymphangitis (peritonitis) about the pavilion of the left oviduct was generally greater in area and more intense than that of the right. After twelve years of careful personal autopsic abdominal inspection and special practice in gynæcology and abdominal surgery, it appears to me that the ratio of appendicitis in man and woman is about

three for man to one for woman. The older statistics rated man as being attacked four times as often as woman. In woman, where the appendix hangs or extends into the pelvis 48 per cent., it surely has intimate relations with the ovary, parovarium, and, above all else, with the pavilion of the oviduct, which in general infects the pelvic peritoneum in 80 per cent. of adult women (much less, however, on the right (65 per cent.) than in the left side (35 per cent.)). In regard to disease of the appendix and the pelvic organs, of course the first offender is the oviducal pavilion, which infects the appendix especially periodically. Again, as found in the abdominal inspections, the infected oviduct, ovary, and ligamentum latum may become fixed or attached to the appendix, and *vice versa*. The appendix is liable to become attached to pelvic structures after operations in the pelvis. The multiple symptoms of appendicitis in women are greater than in men. In the autopsic abdominal inspection, it is not infrequent to observe in the female peritoneum, between genitals and appendix, an indefinitely inflamed area which extends from the genitals to the appendix or from the appendix to the genitals. The inspection generally makes evident that the peritonitis began at the oviducal pavilion, but in some cases, with the open dead body before me, I was unable to say whether the existing peritonitis area, circumscribing both the appendix and (right) genitals, began in the oviducal pavilion or in the appendix. In a certain number of women who complain of vague pains in the pelvis and whose genitals do not present palpable disease, chronic appendicitis with adhesions should be considered. Women with the stigmata of hysteria, neurotic or neurasthenic women should be especially examined for some basal cause, among which chronic appendicitis plays a considerable rôle. In subject No. 20, aged thirty-five years, the appendix was adherent to the pavilion of the oviduct.

*The Appendix Resting on the Psoas* (males, 46 per cent.; females, 20 per cent.).—It is the second major position of the appendix. This means that at the autopsy the appendix was found in contact with the psoas muscle. The statement has

no regard to the potential position of the appendix, which showed that the appendix with an elongated fixation apparatus can move especially to the central abdominal cavity by contraction and dilatation (gas or fæces), or by intra-abdominal pressure (chiefly muscular). It may also move from the central abdominal cavity within the traumatic range of action of the psoas. The appendix was within the range of the action of the psoas in 300 males, 52 per cent. (actual autopsic contact 46 per cent.). The appendix was within the range of action of the psoas in 112 females, 32 per cent. (actual autopsic contact, 20 per cent.).

This significantly explains through opportunity for muscular trauma (psoas) why man has more appendicitis than woman. The appendix lies in contact or, at least, within range of traumatic action of the psoas 20 per cent. more in man (52 per cent.) than woman (32 per cent.). When the appendix rests on the psoas in males, 83 per cent. show peritoneal adhesions. When the appendix lies in the pelvis (lesser) in males, 21 per cent. show peritoneal adhesions. When the appendix rests on psoas in females, 85 per cent. show peritoneal adhesions. When the appendix lies in the (lesser) pelvis in females, 27 per cent. show adhesions. In other words, when the appendix is within range of the traumatic action of the psoas, it shows 60 per cent. more peritoneal adhesions than when it lies in the (lesser) pelvis. These records of position and peritoneal adhesions alone show that the trauma of the psoas is a significant factor in appendicitis. It was the numerous peritoneal adhesions surrounding the appendix while lying on the psoas that first called my attention in 1894 to the idea that appendicitis is caused by muscular (psoas) trauma, and at present, after several hundred more autopsies, I am convinced that the view is correct. In 300 males, 151 appendices rested in contact with the traumatic range action of the psoas muscle possessing peritoneal adhesions. In 113 females, thirty-seven appendices were within range of the traumatic action of the psoas, and (thirty-two) of such showed 86 per cent. of peritoneal adhesions.

If the patient possesses an inflamed appendix or area of peritonitis on the psoas, walking becomes impossible on account of the pain due to trauma of the psoas. If the appendix rests on the psoas (females, 20 per cent.; males, 46 per cent.), it is not only liable to pelvic peritoneal lymphangitis from muscular trauma, but, when the appendix is inflamed and rests on the psoas, walking becomes difficult from muscular trauma of the psoas. Every step pains. I have demonstrated such cases by operation and autopsy for years. The position of the appendix as regards its relation to the psoas explains why men (46 per cent. rest on psoas) have more appendicitis and peri-appendicular peritoneal adhesions than women (20 per cent. rest on the psoas). The trauma of the psoas muscle produces appendicitis especially in the spiral appendices lying within its most vigorous range of action when the appendicular lumen is occupied by virulent germs. The appendix of man is within range of traumatic action of the psoas (46 per cent.) twice as often as women (20 per cent.). Also the psoas of man is stronger and much more active than that of woman. In 300 adult males, when the appendix rested on the psoas in 150 cases, it possessed adhesions 126 times, *i.e.*, 84 per cent. of appendices lying in contact with the psoas in adult males possessed peri-appendicular peritoneal adhesions.

In adult females, when the appendix rested on the psoas in thirty-seven cases, it possessed adhesions thirty-two times, and no adhesions five times, *i.e.*, 86 per cent. of appendices lying in contact with the psoas in adult females possesses peri-appendicular peritoneal adhesions.

Is it necessary to further prove that the trauma of the psoas muscle produces peri-appendicular peritoneal adhesions? Whatever factor produces peri-appendicular peritoneal adhesions compromises faecal and vascular circulation in the appendix, limits its nourishment, and devitalizes its cell resistance. Peri-appendicular peritoneal adhesions dislocate the appendix, distort it, kink or twist it, and compromise its lumen, causing retention and perforation of its wall. The trauma of



the psoas muscle is a vital factor in the etiology of appendicitis.

*The Retrocæcal Position of the Appendix* (females, 35 per cent.; males, 20 per cent.).—This is the third major position of the appendix. The appendix in this position lies posterior to the left or right of the median line of the cæcum. (a) The appendix generally springs from the posterior surface and lateral side of the median line of the cæcum. (b) The appendix passes proximalward posterior to the cæcum or along its lateral borders. (c) The most frequent retrocæcal position is where the appendix passes proximalward along the internal border of the cæcum immediately posterior to the distal end of the ileum, *i.e.*, to the left of the mesenteron. (d) The second retrocæcal position of the appendix is where the appendix passes proximalward posterior to the cæcum and external to its median cæcal line. In the retrocæcal position the appendix lies (a) on the psoas, (b) to the left of the psoas, and (c) to the right of the psoas. The right retrocæcal position is the safest of all positions for the appendix to become perforated, as it not only lies in the benign colonic area of peritonitis, but the colon and mesocolon dextrum serve as a barrier to prevent the invasion of infection into the enteronic area. The enteronic area designates the region occupied by the small intestines, which is generally the left distal quadrant of the abdomen. However, the enteronic coils may shift about and superimpose themselves on the colonic area.

In 300 adult males there were fifty-eight cases with the appendix located in the retrocæcal region, with adhesions existing twenty-five times. In other words, 43 per cent. appendices lying in the retrocæcal region possessed peritoneal adhesions. In 113 adult females there were thirty-two cases with the appendix located in the retrocæcal region, adhesions existing fifteen times; 47 per cent. of appendices lying in the retrocæcal region possessed peritoneal adhesions.

The peritoneal adhesions of appendices located in the retrocæcal region are explained by their proximity to the range

of trauma of the psoas; mainly retrocaecal appendices are located directly on the psoas and within its vigorous range.

*The Appendix located to the Right of Psoas* (females, 28 per cent.; males, 18 per cent.).—This is the fourth major position of the appendix in regard to the psoas. The percentage of location accords with the male and female topographical anatomy. The space in the right iliac fossa of woman is greater than that of man. The location of the appendix to the right of psoas muscle is the safest of all positions because it is protected by (a) the benign colonic area, (b) the mesocolon dextrum, (c) the colon dextrum as barriers, and (d) occasionally the right border of the omentum majus aids to circumscribe infectious invasions from the appendix lying to the right border of the psoas. Appendicitis from appendices located to the right of the psoas is relatively rare, as it lies out of the main traumatic muscular action of the psoas. In 300 adult males there were sixty cases with the appendix located to the right of the psoas adhesions existing twenty-five times. In other cases about 40 per cent. appendices located to the right of the psoas possessed peritoneal adhesions,—less than half. In 113 adult females there were thirty-two cases located to the right of the psoas, adhesions existing thirteen times. About 40 per cent. of appendices located to the right of the psoas, peritoneal adhesions,—less than half. The autopsic records show that some of the appendices possessing adhesions on the right of the psoas muscle are due to the trauma of the iliac muscle. The quadratus lumborum may produce sufficient trauma to induce some peritoneal adhesions. Besides, with appendices to the right of psoas, some must occasionally shift within range of the traumatic action of the powerful psoas. Hence, doubtless some of the peri-appendical peritoneal adhesions of the appendices located to the right of the psoas originally arise from the psoas. All surgeons of experience have observed patients with large collections of pus located to the right of the psoas attending to their daily business. The muscular trauma (psoas) of walking is not spent on the tender abscess.

*The Potential Position of the Appendix* (males, 23 per cent.; females, 20 per cent.).—This is the fifth position of the appendix. The potential position of the appendix is a condition in which the appendix possesses a fixation apparatus, elongated sufficiently to assume different positions in the abdomen, but especially in the enteronic area. It is a wandering appendix. The position of the appendix depends mainly on the length and character of the meso-appendix, the mesocolico mesenteron, and also on the arrangement of the ileocæcal apparatus. A long meso-appendix allows the appendix to hang in the pelvis. A short meso-appendix always draws the appendix towards the diaphragm and usually forces it into a spiral, irregular shape. The appendix may assume the potential position through its fixation apparatus and elongated mesocolico mesenteron.

The mesocolon between kidney and cæcum (proximal colonic end) may be usually long as well as the mesenteron on the distal end of the ileum. Both fixation apparatus of colon and distal ileum being elongated allows the appendix to float about in the direction of least resistance, which is among the coils of the enteron in the middle of the abdomen. Also the distention and contraction of the cæcum and colon and other viscera will influence the position of the appendix. A potential position is dependent on the length of the fixation apparatus (the mesocolico mesenteron). The potential position in the quiescent stage of the ileocæcal and other organs is mainly in the colonic area, but when disturbance of viscera occurs the appendix may be forced in the enteronic area. A floating appendix in the enteronic area is very dangerous when perforated, and the life of the patient is scarcely ever saved except by the omentum, the policeman of the belly. However, the floating appendix is quite free from peritoneal adhesions, as it lies in close contact with no vigorous and dangerous trauma. It lies ensconced among the coils of the enteron, the most distal viscus from muscular trauma.

In 300 males the appendix *could* assume, from the length of its fixation apparatus (mesocolico mesenteron), the poten-

tial position 112 times,—that is, the appendix in 37 per cent. of males can assume the potential position. The 112 appendices which *could* assume the potential positions from elongated fixation apparatus possessed adhesions in seventy-five cases. In other words, 66 per cent. of male appendices possessed peritoneal adhesions. The potential or enteronic of the appendix might allow the appendix to shift about, lie within traumatic action of the psoas sufficient time to be damaged, but not to produce sufficient adhesions to fix it and then move to the enteronic area to rupture, so that the potential position of the appendix is a dangerous one.

In females the appendix *could* assume the potential position from the length of its fixation apparatus (mesocolico mesenteron) in thirty-four times,—that is, the appendix in 30 per cent. of females *can* assume the potential position. The thirty-four appendices which *could* assume the potential position possessed adhesion in seventeen cases. In other words, 50 per cent. of female potential appendices possessed peritoneal adhesions. The potential appendices acquired some of the adhesions (male and female) while wandering within the range of traumatic action of the psoas (or other muscle) by visceral movements or infected oviducal pavilions.

As regards the remaining positions of the appendix with reference to the psoas, it may be said they are of much less import, as they are only modifications of the five major positions,—pelvic, retrocaecal, potential, right of psoas, and on psoas; but some of these are sufficiently frequent to note.

(a) In certain cases the appendix would course parallel to the distal ileum over the sacral promontory, and its tip was sometimes long enough to lie in contact with the left psoas (females, 15 per cent.; males, 14 per cent.). This belongs to the potential appendicular position, as it was sufficiently mobile to gain the enteronic area through its anatomic position on the promontory of the sacrum, and also through distention and motion of viscera. The appendix in such cases was generally long, with extensive meso-appendix, consequently straight, and hence less liable to obstruction and retention on its lumen.

(b) The appendix which lies transverse to the ileopsoas and points to the right iliac fossa (females, 6 per cent; males, 7 per cent.) frequently has adhesions about its base (psoas) and a few about its tip or free end which lies in contact with the iliac muscle, where range of traumatic action is so limited. If the appendix perforate in this position in the benign or colonic area of peritoneal lymphangitis it is comparatively safe, as it is soon circumscribed by adhesions.

(c) The appendix which is located on the psoas, parallel to it and pointing towards the ligament of Poupart (female, 10 per cent.; males, 5 per cent.), is not of great interest, as it is located generally so close to Poupart's ligament as to be out of the range of the severe action of the psoas muscle. It has relatively few peri-appendicular adhesions, is frequently straight, and hence less liable to perforation. It is the kindred appendix that suffers most from muscular trauma; drainage is deficient in the compromising lumen.

*Position of the Appendix as Regards Sex* (male, 300; female, 118). (1) The appendix hangs in the pelvis 11 per cent. more in woman than in man. (2) The appendix rests on the psoas 26 per cent. more in man than in woman. (3) The appendix is 3 per cent. more in the potential position in woman than in man. (4) Woman has 15 per cent. more retrocæcal position of the appendix than man. (5) The appendix rests 10 per cent. more to the right of the psoas in woman than in man.

*Peri-Appendicular Adhesions.*—The position of the appendix is significant as regards its relation to the psoas muscle. When the appendix is within the range of action of the psoas muscle, *i.e.*, within the range of muscular trauma, it nearly always has peritoneal adhesions about it; in fact, when any adult bowel segment (appendix, cæcum, distal ileum, or sigmoid flexure) is within range of muscular trauma of the psoas, the rule is that peritoneal adhesions are adjacent to it. A frequent and significant observation was that the free end of the appendix which rested in contact with the range of action of the psoas muscle presented macroscopical and palpable peritoneal adhesions.

In 300 males the appendix possessed peritoneal adhesions in 62 per cent. In 118 females the appendix possessed peritoneal adhesions in 50 per cent. Peritoneal adhesions compromise the vascular circulation of the appendix. (a) By dislocating its structure, (b) adhesions traumatize the nerve periphery, impairing the nerve and inducing pain, (c) peritoneal adhesions compromise the faecal circulation, kinking the appendicular lumen, inducing congestion of faecal and vascular circulation, emigration of microbes through the damaged wall. However, all peritonitic processes tend to obliterate the lymph channels in the peritoneum, and this makes successive peritonic appendicular attacks safer and safer. I proved this matter by testing microscopical sections taken from old white peritonic areas adjacent to the appendix and cæcum which showed obliteration of lymph channels. Any segment of the tractus intestinalis, appendix, cæcum, distal end of the ileum or sigmoid flexure, which rests in contact with the psoas, in its longest range of action, is liable to be surrounded with peritoneal adhesions due to muscular trauma, inducing, at periods of virulent microbic contents, infectious invasions through the mucosa and muscularis of the tractus intestinalis into the serosa, resulting in circumscribed peritoneal adhesions.

The kinked appendix is more liable from adhesions to perforation than the spiral appendix on account of the easily compromised lumen. Frequently its base, which rested on the left border of the psoas or traumatizing common iliac vessel, showed peritoneal adhesions, but the appendicular free end was conspicuously free from adhesions, as it is not within the range of any traumatic muscular action,—resting on the vertebral column widely distant from any muscle or vascular trauma (as the aorta or common iliac). It must be noted that the appendix could and frequently did course parallel to the distal ileum with the cæcum located in the pelvis in a similar manner than they did when the cæcum rested on the belly of the psoas. The potential appendix frequently possesses peritoneal adhesions. It acquires some of these while wandering within range of traumatic action of the psoas. The adhesions

contribute, in one sense, to the safety of the patient, as they fix the appendix in the safe colonic area. In numerous cases adhesions changed and fixed the residence of the appendix in the colonic area. In rarer instances the residence of the appendix was fixed in the enteronic area, especially when the appendix lay parallel to the distal end of the ileum. The frequency of peritoneal adhesion adjacent to the appendix in males (62 per cent.) over that of females (50 per cent.) accords with clinical data. In woman the appendix escapes the long range of traumatic action of the psoas muscle by residing in the pelvis 48 per cent., while in man it resides in the pelvis 37 per cent.

The following table (300 males and 118 females) shows the percentage of the appendix in the five major positions, and also the percentage of peritoneal adhesions accompanying each location.

(1) PELVIC POSITION.

Woman.....	48 per cent.....	adhesions, 27 per cent.
Man.....	37 per cent.....	adhesions, 21 per cent.

(2) RESTING ON PSOAS.

Woman.....	20 per cent.....	adhesions, 85 per cent.
Man.....	46 per cent.....	adhesions, 83 per cent.

(3) RETROCÆCAL.

Woman.....	35 per cent.....	adhesions, 47 per cent.
Man.....	20 per cent.....	adhesions, 43 per cent.

(4) POTENTIAL POSITION.

Woman.....	20 per cent.....	adhesions, 50 per cent.
Man.....	23 per cent.....	adhesions, 62 per cent.

(5) RESTING TO RIGHT OF PSOAS.

Woman.....	28 per cent.....	adhesions, 40 per cent.
Man.....	18 per cent.....	adhesions, 40 per cent.

The percentage of appendicular peritoneal adhesions refers to the number in the specified appendicular location and not to the whole number of subjects. For example, in man, 46 per cent. of the appendices rest on the psoas, and 83 per cent. of such appendices (resting on psoas) present peri-appendicular adhesions.

The present 418 detailed records of adult autopsies per-

formed during the past ten years show, in persons dying from other diseases than appendicitis, 60 per cent. of peritoneal adhesions in the male and 48 per cent. of peritoneal adhesions in the female about the appendix.

The peri-appendicular adhesions are in the vast majority of cases produced by the trauma of the psoas and other muscles. The conclusion is inevitable that (psoas) muscular trauma is a vital factor in the etiology of appendicitis. This is especially the case when the appendix is kinked, twisted, contains virulent microbes, narrow or compromised in its lumen, producing retention. These ample numbers of autopsies convince me that the views I published in 1894 announcing that muscular trauma produced appendicitis was correct.

*Peri-Appendicular Adhesions as regards Sex* (males, 300; females, 118). (1) In the potential position of the appendix man has 12 per cent. more appendicular adhesions than woman. (2) In the pelvic position of the appendix woman has 6 per cent. more peri-appendicular adhesions than man. (3) When the appendix rests on the psoas, woman has 2 per cent. more peri-appendicular adhesions than man. (4) In the retrocaecal positions of the appendix woman has 4 per cent. more peri-appendicular adhesions than man. (5) When the appendix lies to the right of the psoas, the peri-appendicular adhesions are equal in number in both man and woman. Man has about 15 per cent. more peri-appendicular adhesions than woman.

(1) *Absence of Appendix*.—In adult females the appendix was congenitally absent once (subject No. 59). This was accompanied by absence of caecum.

(2) *Non-Descent of Appendix*.—There was practically 3 per cent. of partial or non-descent of the appendix in females.

Incomplete descent of appendix is not uncommon. In subjects Nos. 70 and 53 it required five inches of distal ileum in each case to reach from the usual point of iliac crossing of the psoas muscle to the incompletely descended caecum, and the appendix was likewise non-descended.

In subject No. 100 it required three inches of ileum to



reach from psoas to the incompletely descended cæcum. Subject No. 74 required three and one-half inches of ileum to reach from psoas to non-descended cæcum.

In the 118 females there occurred four cases of partial non-descent of the appendix, *i.e.*, it required three to four inches of ileum to reach from the psoas to the partially descended cæcum and appendix. In other words, the appendix in four cases was three to five inches more proximal than normal. In each of the four cases the appendix rested directly under the liver. It is a comparatively safe location for rupture. The non-descent was due doubtless to arrest of development or intra-uterine peritonitis. In such cases the differential diagnosis between appendicitis, hepatic or renal disease is very difficult.

(3) *Partial Obliteration of the Appendicular Walls.*—There were three typical cases of partial obliteration.

No. 53, aged fifty years, had the free or distal one-third of the six-inch appendix practically obliterated. The entire length was bound in adhesions. This was a case of non-descended foetal-typed cæcum, as it required five inches of ileum to reach from the psoas to meet the non-descended right colon. The appendix was one of the retrocæcal class.

It was probably an intra-uterine peritonitis which caused the arrest of the cæcal descent. No. 5, aged forty-five years, appendix five inches long, extended entirely in pelvis and surrounded by many old adhesions. One inch from its base it became entirely obliterated, and continued as a fibrous cord for one and one-half inches, when it again assumed its natural size and lumen. Ileum entered colon distal to pelvic brim. No. 23 had partial obliteration at its free end. No. 39, aged twenty-six years, appendix four and one-half inches long, retrocæcal position in solid bed of adhesions. Its free end was obliterated to the size of a cotton thread for one and one-half inches. These remarks refer to the walls of the appendix and not to the lumen. With the congenital absence of the entire appendix and three cases of partial obliteration, the range of 118 adult females is observed.

(1) *Absence of the Appendix* (males, 300).—In 300 adult males it was not absent once.

(2) *Non-descent of the Appendix*.—Practically, 300 adult males presented 7 per cent. of non-descent of the cæcum (and consequently the appendix), which was so typical as to interfere with diagnosis and surgical intervention.

This is important to the physician as to the location of pain, the site of the required incision, and to be able to make a differential diagnosis between disease in the gall-bladder, appendix, and kidney. In non-descent of the cæcum, on the right side a silver dollar will cover an important area occupied by important organs, including, viz., (*a*) the appendix, (*b*) the kidney, (*c*) the adrenal, (*d*) the pylorus, (*e*) the gall-bladder, (*f*) the hepatic flexure of the colon, and (*g*) the head of the pancreas.

Non-descent of the cæcum may change the whole diagnostic and even prognostic aspect of the clinical field. No. 7, though a non-descending cæcum, lying immediately below the liver, yet it occupied a potential position because it could be made to touch any abdominal viscus. The intra-uterine peritonitis had arrested the descent of the cæcum, but the mesenterium commune and the post-natal dragging endowed with an elongated fixation apparatus (the mesenterico mesenteron). No. 36 was arrested immediately under the liver, requiring six inches of ileum to reach from the usual point of right psoas crossing to the non-descending cæcum, but it had a seven-inch mesenteron at the ileocæcal junction; and although some pericæcal and peri-appendicular adhesions existed, the appendix could be made to touch every abdominal organ. It occupied a potential position. A cæcum may become arrested in its distal journey from liver to iliac fossa, and practically assume such a position through life; but in post-natal life the fixation apparatus may become so elongated that it can move about through a large abdominal enteronic area, yet always tending to assume its original arrested position. In states of distention of the viscera, it may assume a temporary position among the loops of the enteronic.

In No. 46 the cæcum lay on the right kidney. The kidney appears to be the favorite spot for partially descended cæcum to stop. This may be mechanical, as scarcely ever does the right colon possess a mesocolon.

Occasionally distal to the kidney but frequently proximal to the kidney the mesocolon is liberal. The partially non-descended colon is not infrequently rotated to three-quarters of a circle on the cœliac axis; it is very liable to volvulus. The non-descended cæcum (and appendix) is very liable to possess a mesenterium commune, a mesocolico mesenteron which predisposes to volvulus of the ileocæcal apparatus. When only one segment of the bowel lies within the range of traumatic action of the psoas, it nearly always possesses adhesions, *e.g.*, the ileum alone passing over the psoas frequently presents periliac adhesions.

(3) *Partial Obliteration of the Appendicular Walls.*—There were practically five cases with partially obliterated walls in 300 adult males. No. 188, aged thirty-five years, and No. 174, aged thirty-five years, showed almost entire obliteration in the middle of the appendix, lay on the psoas, and was surrounded by dense adhesions. No. 124, aged fifty-five years, showed partial obliteration to the size of a whip-cord for an inch with an apparent normal basal and free end. In one other case of partial obliteration of the appendicular wall, the character was peri-appendicular adhesions. In case 188 the ileum passed over the psoas, becoming united to it by adhesions, after which it was compelled to journey proximalward about three inches to meet the incomplete descended cæcum. From the cases here recorded (males and females) there appears to be some relation between partially obliterated appendicular walls and non-descended appendix (cæcum.) Doubtless a late intra-uterine peritonitis arose and aided in atrophy.

In 300 adult males there were thirty-one perceptible partial descent of the cæcum (consequently the appendix). Ten cases showed two inches of non-descent of the cæcum, which is left out of practical consideration. Practically, for surgical

purposes, there were twenty-one cases, or 7 per cent., of non-descent of three to six inches. The shortest non-descent of the cæcum in the twenty-one cases was three inches and the longest was six inches, *i.e.*, it required six inches of distal ileum to reach from the usual point of its crossing of the right psoas to meet the non-descended cæcum. The average non-descent for the twenty-one cases was four inches. The average length of the appendix in the cases was three inches. The peritoneal adhesion about the appendix was 70 per cent. and about the cæcum, 54 per cent., while the peri-iliac adhesion where it crossed the psoas was 75 per cent. In other words, 25 per cent. of segments of distal ileum which crossed the psoas and passed proximally to meet the non-descended cæcum did not show peri-iliac adhesions. The types of cæca were, foetal, 67 per cent.; symmetrical, 22 per cent.; non-symmetrical, 6 per cent.; atrophic, 3 per cent.

The data in non-descent of the (male) cæcum (and consequently of the appendix) show (1) a preponderance of foetal cæca (67 per cent.); (2) arrest of cæcum adjacent to gall-bladder; (3) arrest of cæcum on an adrenal; (4) wide variableness of the ileocæco-appendicular apparatus; (5) non-descended cæca (and appendices) show 70 per cent. of peri-appendicular adhesions, and 54 per cent. of pericæcal adhesions; (6) when the distal ileum passes over the psoas to meet the non-descended cæcum, muscular trauma has produced 75 per cent. of peri-iliac adhesions; (7) non-descended cæcum shows a tendency to mesenterium commune; (8) though the cæcum and the appendix may be non-descended, yet the appendix may assume a potential position from its free mesenterium commune; (9) intra-uterine peritonitis appears to be the basal cause of non-descent of the cæcum (and consequently of the appendix).

#### CONCLUSIONS.

(1) Trauma of the psoas muscle produces appendicitis.

(2) Muscular trauma produces appendicitis if the damage occurs in the appendix when it contains virulent microbes, and especially if the spiral or kinked condition and peri-appen-

dicular adhesions produce increased tension of secretion, in short, if drainage be compromised.

(3) Over 70 per cent. of peritoneal exudates occur in the right iliac fossa adjacent to the psoas, and any peritoneal exudate associated with the ileocæco appendicular apparatus compromises its anatomy and physiology.

(4) In males 50 per cent. and in females 40 per cent. of peri-appendicular adhesions exist. Peri-appendicular peritoneal adhesions compromise (*a*) the fæcal circulation of the appendix, obstruct drainage; (*b*) they compromise blood and lymph circulation; (*c*) they compromise peristalsis; (*d*) they traumatize nerve periphery; (*e*) they compromise the nourishment of the appendix; (*f*) they cripple and devitalize the appendix, making it unable to resist trauma and infection.

(5) When muscular trauma acts on an appendix containing virulent germs compromised by peri-appendicular adhesion, in drainage, in fæcal, blood, and in lymph circulation, limited in nourishment, and peristalsis with local devitalized atrophic cells end, appendicitis, with ulceration and obliteration, perforation is liable to occur.

(6) The dangerous appendix is the one in a spiral or kinked shape within range of traumatic action of the psoas or other powerful muscles. The size and length of the appendix have no special relation to the frequency of appendicitis.

(7) The ratio of appendicitis in man and woman is about 3 to 1.

(8) It is chiefly owing to the fact that man's appendix is more exposed to psoas muscular trauma than that of woman. The appendix is practically the only segment of the tractus intestinalis in which muscular trauma produces ulceration or perforation. This is due to lack of appendicular cell vitality, lack of blood, lymph, and nerve supply, to atrophic cells, and to poor nourishment.

(9) Other segments of the tractus intestinalis than the appendix lying within range of muscular trauma show similar adjacent peritoneal adhesions, but no ulceration or perforation because of more perfect drainage and higher cell vitality.

(10) In males (300), the cæcum, lying within range of the action of psoas, presents 60 per cent. of peritoneal adhesions.

(11) In females (118), the cæcum, lying within muscular trauma of the psoas, presents 60 per cent. of peritoneal adhesions.

(12) Peritoneal adhesions in the mesosigmoid from trauma of the left psoas are 80 per cent. When the distal end of the ileum lies within the traumatic range of action of the right psoas, it presents 75 per cent. peri-iliac adhesions.

(13) The cæcum, distal end of the ileum or sigmoid, though surrounded by distinctly macroscopical peritoneal adhesions, do not present mucal ulceration or peritoneal perforation on account of good drainage and cell vitality.

(14) The vitality of other segments of the tractus intestinalis than the appendix resists the conflict, trauma and infection of life's forces, but the appendix does not.

(15) The position of the appendix depends on (*a*) the length of the mesocolico mesenterium (fixation apparatus), (*b*) the state of distention of the cæcum, (*c*) the state of distention of the adjacent viscera, uterus, gastrium, colon, enteron, liver, and kidney, (*d*) the length of the appendix, (*e*) the degree of visceral ptosis and laxity of the abdominal walls, (*f*) the sex, shape of the abdominal cavity, and (*g*) the existing peritoneal adhesions in the ileocæcal appendicular apparatus.

(16) Athletes, base- and foot-ball players, bicycle riders, swimmers, blacksmiths, and trades of vigorous physical activity, in short, heavy workers who vigorously use the psoas, have appendicitis.

(17) Cases of appendicitis frequently arise after epidemics which induce catarrh of the tractus intestinalis, as typhoid fever, la grippe; especially after fruit seasons, summer diarrhœa, and catarrh or endo-appendicitis arise, because the damaged tunics of the appendix (mucosa and muscularis) do not withstand the muscular trauma of the psoas with accompanying infectious invasions and the obstructed drainage due to compromising peri-appendicular adhesions.

(18) Second or repeated attacks of appendicitis are less dangerous, because the first attack blocks and obliterates the adjacent lymphatics, so that the radiating channels are limited in capacity to carry infection.

(19) Almost all post-mortem and clinical evidence points to the appendix as the organ which is the most dangerous and treacherous of all abdominal viscera.

(20) The appendix being an atrophied organ, its cells are devitalized with a limited blood, lymph, and nerve supply and deficient nourishment; the weakest segment of the tractus intestinalis is therefore an easy prey to trauma and infection.

(21) The appendix is relatively large at birth, and it decreases in size through every subsequent decade of life; hence progressive atrophy with devitalized cells and damage from peri-appendicular adhesions make the appendix a dangerous organ in adult life.

(22) One hundred and eighteen females showed partial non-descent of the cæcum (and consequently the appendix) in 4 per cent.

(23) Three hundred males showed partial non-descent of the cæcum (and consequently the appendix) in 7 per cent.

(24) To find the appendix in operating, follow the distally directed colonic bands (*tænia coli*) to the point where they converge at the base of the appendix.

(25) The data of this paper, confirmed by twelve years of autopsic abdominal inspection and a decade of abdominal surgery, teach that the frequent peri-appendicular adhesions are not appendicitis but peritonitis; however, the peri-appendicular adhesions are important steps in the journey of trauma and infection with obstructed drainage towards appendicitis.

(26) The foreign body in the appendix is dangerous, because in a non-resisting organ like the appendix it soon produces ulceration, and ultimately perforation, because drainage is deficient.

(27) The dangerous appendix is that in spiral or kinked condition when drainage is easily compromised.

(28) The appendix, like the mesonephritic rests, is of no

physiological or anatomical importance to the adult, but from the atrophic devitalized resistance of its cells it easily succumbs to trauma and infection, jeopardizing the subject to the most profound and treacherous of all abdominal diseases.

(29) All fading organs are especially liable to the disasters of trauma, infection, and malignancy.

(30) The appendix develops and atrophies irregularly. Its size and function have regard to age.

(31) The appendix varies more in position than any other abdominal viscus. It is probable that its position and growth, whether directed proximal, distal, or laterally, have very little to do with the evacuation of its contents if the lumen be not compromised by spirality or adhesions, as any healthy appendix is capable of emptying itself.

(32) Its size has the wide limit in variation of all atrophic organs, as, *e.g.*, the mesonephros.

(33) The appendix appears to increase in size from birth to about the twentieth year, when it decreases for every subsequent decade of life.

(34) The obliteration of the appendicular lumen by strictures or connective tissue increases from birth to death from constant atrophy and retrograde processes, as noted by the excellent labor of Ribbart. The frequent incipient attacks of adult life are due to fading vascularity.

(35) Of the three organs, distal ileum, appendix, and cæcum, which lie within range of traumatic action of the psoas, the least resistant (the appendix) is surrounded by the vast majority of peritoneal adhesions.

(36) Peri-appendicular adhesions check appendicular peristalsis and traumatize nerve periphery resulting in appendicular colic.

(37) Pain in the right side in walking, or pain passing distalward in the distal extremity, may indicate peritoneal adhesions traumatizing the anterior crural nerve or producing a neuritis.

(38) Pain may also arise in the right ovarian plexus or



right spermatic cord from extension of inflammatory processes, peritonitis, in either structure.

(39) The appendix is the weakest segment of the tractus intestinalis because (*a*) it lacks in vital cell resistance, (*b*) its blood supply is limited, (*c*) it is defective in drainage, (*d*) it is compromised by more adhesions than any other segment, (*e*) it is subject to vigorous muscular trauma.

(40) The appendix and meso-appendix are frequently infected from the oviducal pavilions, and *vice versa*, to a large extent. Doubtless the formation of the (atrophic) appendix may have its origin in erect animals (erect apes, wombat, and man) through absence of the mesenterium commune (curtailing blood supply), the more complete axil rotation of the tractus intestinalis about the superior mesenteric vessels (again curtailing blood supply), and through the slow descent of the cæcum forcing its journey through the subserous connective tissue (constricting blood-vessels) at the proximal end of the colon. Hence the formation of the appendix is due to the constriction of blood supply through extensive axil rotation of the tractus intestinalis about the superior mesenteron vessels and nerve.

(41) A factor to consider in regard to the appendix is visceral ptosis, which is due to separation and elongation of the fascial and muscular fibres of the abdominal wall, especially at the linea alba and semilunares as well as diastasis of the recti-abdominales. The mesenteries, not being made for mechanical support, allow the viscera to follow the yielding abdominal wall; this condition increases the number of potential appendices and multiplies the chances for appendicular disease by compromising circulation, assimilation, and traumatizing nerve periphery.

# THE VALUE OF THE RÖNTGEN METHOD OF DIAGNOSIS IN DETECTING AND EXCLUDING RENAL AND URETERAL CALCULI.<sup>1</sup>

By CHARLES LESTER LEONARD, M.D.,  
OF PHILADELPHIA.

THE formation of a renal calculus generally takes place without producing any recognizable symptoms. The condition is not suspected until the calculus interferes with the function of the kidney or that of the ureter. This may take place while the calculus is small, or not until it has attained large proportions. The first symptom that usually attracts attention is pain. Either a dull, diffuse ache in the lumbar region, or it may be a severe attack of colic. This is sometimes accompanied by sufficient functional disturbance to produce a slight albuminuria, or a few leucocytes and red blood-cells may be found in the urine. If colic is present, and the symptoms are severer in character, interference with the function of the ureter is indicated. All these symptoms may, however, result from other causes, either intra- or perinephritic, and may even be more marked, and yet no calculus be present. The difficulties that lie in the way of an accurate differential diagnosis in the incipiency of this condition are therefore very manifest.

A short time ago, the diagnosis of renal calculus was never made until the classical symptoms showed that the pathological process had so far advanced as to render surgical intervention necessary, and yet hazardous. At that time the diagnosis of calculous ureteritis was never made, and many patients lost one kidney as the result of unilateral anuria, and many others died without any other diagnosis than "suppression of urine" ever

<sup>1</sup> Read before the New York Academy of Medicine, January 17, 1901.

being made. The exact diagnosis of calculous ureteritis is seldom made even now. Many patients suffer the loss of the functional activity of one kidney because the impaction of a calculus is not recognized, and the resulting anuria leads to the atrophy and destruction of the affected kidney. The clinical pictures presented by destruction and recovery are identical. If a calculus passes, after an attack of renal colic, and escapes detection, the pain subsides, the urine clears, and perfect function is restored. If a calculus becomes impacted in the ureter, the symptoms do not differ apparently. The anuria destroys the function of the kidney, and the pain ceases. The urine that passes from the other kidney is normal, and the "cure" is attributed to this or that kind of internal medication, or the true condition is not suspected, and the attack is attributed to some other cause.

The possibility of such an occurrence is readily admitted. Its results have been found in many post-mortem examinations. The results obtained by the Röntgen method of diagnosis show that it is probably of more frequent occurrence than has been suspected. It is generally held that renal calculus is much more frequent than ureteral calculus. Of the thirty-six cases in which calculi have been detected by the author by this method, nineteen, or over 50 per cent., have been cases of ureteral calculus.

The difficulties that lie in the way of the establishment of a rational diagnosis by the older methods is clearly illustrated by the varying symptomatology of the cases in which calculi were found. In five cases, a slight albuminuria, a few leucocytes, and an occasional red blood-cell were all that was shown by the urinalysis. The previous history was indefinite, with an entire absence of true colic, while the only subjective symptom had been a dull, indefinite ache in the lumbar region. In another group, the differentiation could not be made between a movable kidney, a twisted or valvular ureter, or an ureteral calculus. In three cases, an intermittent or flush-tank hydro-nephrosis, resulting from the partial occlusion of the ureter by a calculus, had led to a diagnosis of movable or floating kidney.

The variation in size had been mistaken for a change in position. In one case, in which the urine was absolutely normal, the calculus apparently blocking the ureter completely, the renal crises and ureteral colic had been attended with gastric disturbance and vomiting. This case had been described clinically as a true case of nervous dyspepsia. Five cases, on the other hand, that were sent for confirmation of a positive calculus diagnosis, proved at the operation to confirm the negative diagnosis rendered by the Röntgen examination.

The rendering of correct diagnoses in such cases as these, where the symptoms are indefinite or wanting, illustrates the great value of this method. The positive diagnosis has, however, a greater value than the simple detection of a calculus; it is more accurate, comprehensive, and precise than any other method. The position of a calculus or calculi in both kidneys and ureters is determined with a precision that limits the field of operation, makes the operation more accurate, and assures its completeness. It is no longer necessary to open a hydro-nephrotic kidney before the calculus in the ureter, which is the real cause, can be located. The operation is directed immediately to the ureteral calculus, and the whole condition remedied by its removal. In two cases that have been examined, after operation upon one kidney and the removal of a calculus, calculi have been found in the other kidney, and in one a calculus was also found in the kidney previously operated upon. Such incomplete operations cannot be done after a thorough Röntgen examination.

Renal lithiasis is undoubtedly dependent in a measure on some systemic cause. Calculi have been present in both kidneys or ureters in four cases of those examined. This is the only method, except double exploratory nephrotomy, by which it is possible to exclude calculus from the apparently healthy kidney before a nephrolithotomy or a nephrectomy is undertaken.

The detection of three calculi weighing one grain or less in the kidney and ureters, and their subsequent passage, has demonstrated that this method is capable of detecting the most minute calculi in their incipient stage. This is of the utmost

value to the patient. These are the calculi that produce complete anuria by occluding the ureters. They are the more dangerous because they produce fewer and less definite symptoms.

Mr. Henry Morris has said of them: "If such silent, lurking calculi could be discovered and removed, many deaths from calculous anuria, much illness and suffering from perinephric abscesses and renal fistulæ, and many kidneys undergoing atrophy and degeneration might be saved by well-timed operation."

Statistics derived from the operations of the most competent renal surgeons show that the mortality of nephrolithotomy is but 2 or 3 per cent., if the operation is undertaken when the calculus is small and before infection has taken place. When the characteristic symptoms are present and infection has taken place, the mortality rapidly rises to 25 per cent.

This method assures the detection of all calculi as soon as a suspicion points to their presence, and by their early diagnosis affords the patient all the advantages of an early operation. The examination is made with no inconvenience to the patient and without the introduction of instruments into the bladder or ureters, and the consequent danger of infection.

The value of the absolute negative diagnosis by this method is possibly greater than that of the positive. It often renders operative intervention unnecessary, and at the same time renders medical treatment rational and not dangerous.

The accuracy of the negative diagnosis by the Röntgen method has been seriously and frequently questioned. Since claiming that the negative diagnosis is accurate, the author has examined 136 cases suspected of having renal or ureteral calculi. A negative diagnosis has been rendered in 100 of these cases. In only one case has that diagnosis been disproved by the operation. In that case the error resulted from a misplaced plate and defective reading of the negative.

Not all of these patients have been subjected to operation, but in many of them the negative diagnosis has been confirmed

by the subsequent development of other forms of disease, by other operations, or by post-mortem examination.

The absolute negative diagnosis and the exclusion of all calculi is based upon the axiom that if rays are employed that will differentiate between the shadows of tissues less dense than the least dense calculus, all calculi will be detected.

The production of negatives showing tissue differentiation in the lumbar and pelvic regions is the basis upon which the negative diagnosis rests. Such a negative is a mechanically produced proof that a quality of ray has been employed which would detect and yet not penetrate all qualities of calculi. The only sources of error lie, not in the method, but in its proper employment and interpretation. Experience in developing and employing the various qualities of the Röntgen rays must be combined with clinical experience in translating the diagnosis from the negative. The reading of the negative is often the most difficult part of the diagnosis, and especially in the negative diagnosis requires careful study of the plates. When, however, the correct reading has been determined, the negatives form a mechanically produced proof that is capable of demonstration.

In many cases, the negative diagnosis makes all operation unnecessary. It does not, however, preclude exploratory nephrotomy, as it is often necessary to determine the exact pathological condition present and to remedy it. The negative diagnosis makes the actual incision into the kidney, and the consequent risk of urinary fistula, unnecessary, unless it is demanded by some other macroscopic pathological lesion. If a plastic ureteral operation, the opening of an abscess or a nephrectomy, is found necessary, the negative calculus diagnosis eliminates any danger that might have arisen from an unsuspected calculus in the other kidney or ureter. On the other hand, the detection of a calculus by the Röntgen method has been, in two cases, the only indication, during an exploratory nephrotomy, for the incision into the kidney and the removal of the calculus. In both cases, the other symptoms were so indefinite as to make the incision unwarranted.

A negative diagnosis by this method is the means by which the non-operative treatment of suspicious cases can be made rational. The dangers surrounding the treatment of cases that simulate renal or ureteral calculus, by non-operative methods, are clearly evident from the consideration of the similarity in symptomatology between recovery and the destruction of a kidney by calculous anuria.

The passage spontaneously of a number of the ureteral and of one renal calculus, after they had been detected, points towards conservatism in operating in certain cases. Such a course is safe and rational where it is based upon the data obtained by this method. The exact determination of the size and position of a calculus makes it possible to estimate the chances of its passage. It makes it safe to wait, as the seat of any operation that may be necessary is predetermined. The presence of infection, the size and position of the calculus, and the previous history will have much weight in these cases. The persistence of pain in the lumbar region and the history of repeated attacks, with the presence of blood in the urine, point to partial occlusion and make delay permissible. A large calculus, the presence of infection, or an absolutely normal urine, indicating unilateral anuria, make immediate operative intervention imperative if the kidney is to be preserved. Such conservative treatment must, however, be conducted under strict surgical supervision, and frequent analyses of the urine should be made.

The ease with which such minute calculi slip into the bladder renders it necessary to search for them in the bladder before any operation is commenced for their removal. This precaution should always be observed with small calculi, and the bladder carefully examined by a Bigelow's evacuator while the patient is under the anæsthetic before the operation is commenced.

The effect of this method of diagnosis upon operative procedures has been marked. The field of operation has been localized to the point where the calculus is situated. The completeness of the operation is assured by the determination of the

exact number and position of the calculi. The calculus can be removed through a much smaller wound in the kidney, with the assurance that no calculi are left behind. Ureteral calculi are attacked directly either by the extraperitoneal route, by transperitoneal ureterolithotomy, and by puncture of the ureter through the vaginal vault. All of these methods have been successfully employed in one or more of the cases examined.

The dilatation of the ureter by the introduction of ureteral dilators has been employed with success, by Dr. Howard A. Kelly, in the female. The author would suggest that a similar method be employed in the male by the following modification. After a suprapubic cystotomy, which is often necessary in the search for calculi in the deep pelvic portions of the ureters, the ureteral dilators, or for exploratory purposes a ureteral catheter, can be passed through the urethra and guided, by utilizing the cystotomy wound, into the ureteral orifices. This method would seem especially applicable to cases in which previous pelvic inflammation has bound the bladder and ureters firmly down to the floor of the pelvis.

With the exact knowledge of the location of a calculus, it will often be possible to palpate it, and in especially favorable instances to push it along by massage, or even by crushing small calculi of suitable composition, to secure their removal.

From the examination of 136 cases suspected of having renal or ureteral calculi, and the detection of nineteen cases of ureteral and seventeen cases of renal calculus, the author draws these conclusions:

(1) That both the negative and positive diagnoses by the Röntgen method are accurate and valuable.

(2) That ureteral calculus is much more common than has been supposed, or about 50 per cent. of all cases of calculus.

(3) That it is impossible to arrive at as accurate a diagnosis of calculus by other methods.

(4) That this method is comprehensive, and aids operative intervention by localizing all calculi and excluding calculi from the other kidney.

(5) That non-operative treatment, without a negative



diagnosis by this method, is irrational and dangerous in cases that are at all suspicious.

(6) That this method is precise, because its results are mechanically produced, but that accuracy in its employment and care in reading the results are necessary to the avoidance of error.

(7) That the data obtained by this method make non-operative, conservative treatment rational in cases of small calculi low down in the ureter that can be expected to pass.

(8) That the negative diagnosis does not preclude exploratory nephrotomy, but does make unnecessary the actual incision into the kidney in search for calculi.

(9) The dilatation of the ureter with bougies, as has been practised in the female, may be employed in the male by utilizing a suprapubic cystotomy wound to guide the instruments from the urethra into the ureters.

# ILEUS DUE TO VASCULAR OBSTRUCTION.<sup>1</sup>

By L. L. McARTHUR, M.D.,

OF CHICAGO.

VASCULAR or circulation ileus comprises those infrequent cases of intestinal obstruction which are dependent upon embolism or thrombosis of the arterial or venous circulation of the affected bowel. Accustomed as we are to the striking phenomena incident to the embolism or thrombosis of a cranial vessel, no surprise is expressed on its occurrence, and we proceed at once to the anatomic, pathologic, and therapeutic deductions which the symptoms justify. In exactly similar manner vessels in other parts of the body may be the site of identical pathologic lesions, but, because of lack of equally characteristic symptoms and the comparatively recent surgical access to these sites, the nature of the process has been largely ignored, rarely recognized antemortem, and looked upon in the dead-house as curiosities. Yet the condition of embolism of the superior mesenteric has been recognized antemortem, as well as proven by operative interference. Those causes inducing embolism and thrombosis in other vessels may exert similar influences in the intestinal circulatory apparatus. Cardiac valvular vegetations, syphilis, endarteritis, etc., may induce occlusion of the superior or inferior mesenteric artery, with the resultant gangrene of the bowel wall, varying in extent with the size of the vessel occluded. Again, just as in the extremities we see gangrene through obstruction in the arterial or venous side, with their varying degrees of moisture and exudate, so in the intestinal vessel we have differing types of gangrene according as the arterial or venous side is involved. In arteries the throm-

<sup>1</sup> Read at a Joint Meeting of the Chicago Surgical and the Chicago Medical Societies, December 5, 1900.

bus usually extends to the next branch above, while in the veins often far beyond the primary focus. Hence the arterial lesion may be quite limited and amenable to treatment, while the venous thrombosis, starting, perhaps, in a small, infected radicle, may be fatally extensive. We have then ileus, *a*, embolic; *b*, thrombotic.

*Embolic* ileus, through embolism of the superior or inferior mesenteric arteries or their branches, though of rare occurrence, is occasionally seen, and must be dealt with in making up a diagnosis. Cardiac vegetations, or any other embolus floating along in the blood stream, may lodge in either branch with the *necessary* sequela of gangrene of a more or less extensive portion of the bowel, according as a large branch or the main trunk is occluded. *Necessary* because the intestines, unlike other portions of the body, have no collateral circulation to assist in maintaining their nutrition. An endarteritis (syphilitic or otherwise), a bullet wound, or a surgical trauma, a near-lying strongulus, or an aneurism, may provoke the same conditions (death of the bowel wall) by inducing a thrombosis in these very vessels.

Thrombosis of the mesenteric veins similarly occurs, and is almost always due to an infective phlebitis having its origin in the intestinal mucosa. Just as differences in the character of the gangrene exist as the arterial or venous supply of an extremity is occluded, the œdema being intense if the vein, while little or none if the artery, be the seat of the lesion, so the gangrene, incident to the arterial supply of the gut being cut off, will differ strikingly from that caused by a corresponding venous thrombosis. With the former, the stasis, the vascular necrobiosis, the transudation of blood into the intercapillary spaces, death of the bowel with the conditions all favorable for rapid invasion by intestinal bacteria, while if the disturbance come on the venous side the hyperæmia, the immense exudation of fluids and blood-corpuscles give rise to the perhaps most constant symptom of blood in stools and hæmatemesis. In 1875, Litten experimentally induced ileus of this type by ligation of the mesenteric vessels for the purpose of

studying the changes taking place in the intestinal walls. Since his memorable report, numerous investigators, notably Posner, Wreden, Brunner, and Makletzow, have in their studies of intestinal bacteria under these conditions shown their ability to pass through the intestinal wall in so brief a time as eighteen hours; most pronounced when the obstruction was on the venous side and accompanied by most exudate, both within and without the bowel.

When the arterial supply is cut off by an embolism, the death of all coats is so sudden there is not time to throw out the protective plastic lymph on the peritoneal surface. The bowel, therefore, has that smooth, steel-blue, black, shiny appearance presented in many hernial sacs whose contents have been suddenly strangulated and all their blood supply cut off. While on the other hand the dark, reddish-black bowel with roughened peritoneum due to the venous thrombosis, with more or less exudate (plastic and watery), corresponds to the hernial contents whose venous return flow has been retarded but not cut off, while the arterial flow remains intact.

To open an abdomen for ileus and find loops of black gangrenous intestines, perhaps the entire small and part of the large intestine lying there freely movable with no visible cause for its death, and no apparent cause for its obstruction, is one of the most startling things it has been my fortune to meet with in all my surgical experience. I freely confess many minutes of valuable time passed before I recognized the nature of the process of which so little has been written. May I urge, then, the putting now on record, as I shall mine, any similar experience had by those present, that the number may be at last increased sufficiently to make therefrom logical deductions.

Makletzow (before quoted) showed that in ileus induced by venous ligation bacteria can pass through the wall, while the only discoverable lesion was that of a pronounced venous hyperæmia. Kocher, in his memorable address on this subject before the British Medical Society, called attention to the lesson he had learned in the dead-house in the study of his fatal cases, namely, that the fatality of obstruction from simple bands,

torsions, volvulus, and the like was far greater than in the most extensive resections. He teaches that every physician and surgeon should realize that the majority of deaths were not due to the severity of the immediate lesion, but that farther up the proximal bowel, ecchymosis, denudation of mucous membrane, even death of the entire wall thickness, may occur. Here, too, is the probable source of that dark vomitus so significant of impending peritonitis. Therefore it is necessary to go well above the obstruction in removal of the proximal end in the removal of dangerous tissues. He specifically states "the chief danger of every ileus lies in the circulatory disturbance and its sequences, hyperæmia and hæmorrhage with infarct."

The symptomatology as determined from what literature is to be found gives as the four most constant symptoms indicative of ileus caused by mesenteric embolism or thrombosis.

(1) Blood seen either in the washings from bowel, in bowel movements and in the vomitus, unaccompanied by the tumor of intussusception.

(2) Colicky-like pains, associated with pains in back and lumbar region.

(3) Early collapse if the embolism has been sudden or extensive.

(4) Cardiac disturbance, arythmia, great frequency, albuminuria.

The subjoined history corresponds well with those cases found in the literature chiefly reported in Virchow's *Archiv* and Schmidt's *Jahrbücher*, in some of which the diagnosis was ventured intra vitam, and in which, as in Elliott's and Hahn's cases, operative interference was instituted, in the former, successfully.

I herewith submit the history, as supplied me by Dr. Perekhan, of a patient dying of this form of ileus, on whom I was called to make a laparotomy, Drs. Billings and Perekhan assisting. It corresponds closely with those of similar cases reported, and is interesting in presenting some prodromal symptoms.

W. R. C., aged thirty-five years, married, capitalist, weight about 200 pounds, for nearly two years, at intervals varying from four to six weeks, has been suffering, especially after over-indulgence in eating and drinking, from uncomfortable feeling in the epigastrium, and at times this sensation extended all over the abdominal cavity, slight nausea always accompanied, but no vomiting and no fever. These supposed attacks of indigestion I was often called to treat, and was able to relieve, by antiseptic laxatives and dieting, in the course of two or three days.

April 4, 1897, I was called to see the patient, and found him complaining from pain in the region of the stomach, had slight nausea, some tympanitis, but no fever, no vomiting, no soreness on manipulations. The usual treatment was given, but the symptoms remained about the same for three days; on the 7th he stated that the pain was extending all over the abdomen, and also to his back in the lumbar region. He seemed to believe it to be rheumatic, and attributed it to sleeping with the window open.

April 11 feels about the same; he is up and around the room; his bowels have moved well, and contained no blood. Temperature normal.

April 12, bowels moved again, no fever, no vomiting; an examination of urine on this date was negative, the pain in the abdomen and in the back along the spine somewhat severer. He was given a hot bath, a light massage, and the back painted with tincture of iodine. Towards night he was very restless, so that it was necessary to give him morphia hypodermically.

April 13, consultation with Dr. Frank Billings; patient had no fever, no pain on deep pressure over the abdomen or the back; he seems to feel better, bowels had moved early in the day, and the movement was natural and contained no blood. The case was diagnosed as rheumatic pains in the back and walls of the abdomen; sodium salicylate, acetate of potash, and colchicum ordered. During the night, however, the pain returned, and was so severe as to require subcutaneous injection of morphia; under the influence of the latter he had a comparatively fair night.

April 14, at 10 A.M., the pain returned and was felt mostly in the abdomen; it grew worse towards noon; one-quarter grain of morphia sulphate with  $\frac{1}{150}$  of a grain of atropia were given, and repeated three times during the afternoon, with only temporary relief. The pain was continuous, but more or less paroxysmal,

due, undoubtedly, to exhaustion of the nerve centres for a time. There was no vomiting, no straining at stools, no discharge of bloody mucus. Dr. Billings was summoned again, and later on Dr. L. L. McArthur, and, while the preparations for an operation were taking place, the patient had to be given chloroform to ease his suffering. The operation was performed at 8.30 P.M. The whole of the small intestines were gangrenous as well as the ascending and transverse colon. The condition was due to occlusion of the superior mesenteric artery. Patient expired on the table. No adhesions, bands, torsions, nor internal herniæ found.

# ILEUS DUE TO MECHANICAL OBSTRUCTION TO THE FÆCAL CURRENT.<sup>1</sup>

By D. A. K. STEELE, M.D.,

OF CHICAGO.

IN the present paper I have limited my remarks to mechanical ileus or enterostenosis, or acute intestinal obstruction in which fæcal movement is mechanically impeded or prevented, a condition that is accompanied by pretty uniform and definite symptoms, and almost invariably terminates in the death of the patient within a comparatively few days, unless the mechanical obstruction to the fæcal current is removed by a surgical intervention. This limitation, of course, excludes a large number of cases of ileus that have an inherent tendency to recover under expectant or medicinal treatment, such, for example, as adynamic or paralytic ileus, dynamic, postoperative, septic, reflex, vascular, and ileus due to neoplasms. The latter varieties, however, require prompt surgical intervention to save life. We exclude also congenital impermeability of the intestinal canal. For a clearer understanding of the pathology of mechanical ileus, we may classify the various forms of acute intestinal obstruction as based upon an anatomical cause: First, from compression; second, from obstruction; third, from constriction.

Obstruction to the intestine by compression from without includes all forms of internal strangulation of the bowel, and is accompanied by symptoms identical with those of external strangulated hernia. The division adopted by Treves is generally followed, to wit:

(1) Strangulation by peritoneal false bands, or omental cords.

<sup>1</sup> Read at a Joint Meeting of the Chicago Surgical and the Chicago Medical Societies, December 5, 1900.



(2) Strangulation from diverticula.

(3) Strangulation by normal structures abnormally attached.

(4) Strangulation through slits or apertures on the mesentery, omentum, or peritoneal bands.

(1) Whenever we have an aseptic or plastic peritonitis, we are likely to have the formation of adhesions between adjacent coats of intestines by reason of the lymph exudate, which in time gradually becomes elongated and stretched out until it forms bands or false ligaments of considerable length, attached at one end to the intestine, at the other to a neighboring loop of intestine, to the abdominal wall, to the omentum, or mesentery, or to the bladder, uterus, ovary, tube, appendix, or some viscus, so that it becomes a source of danger to the patient and a frequent cause of ileus by permitting a loop of intestine to slip under or over them, or to be looped about them in a noose. Such adhesions and bands may be the result of pelvic peritonitis, or a local peritonitis around a hernia, or the vermiform appendix, or the gall-bladder; and they are frequently postoperative, due to a stump improperly sutured, or an intraperitoneal lesion left denuded of peritoneum, to septic infection, to foreign bodies, as ligatures, sutures, sponges, gauze, drainage tubes, etc., or too long exposure of the peritoneal surface to dry air or too much handling, or by the use of antiseptic solutions in the abdomen, or anything that will abrade or infect the endothelial covering of the bowel. I have operated on a considerable number of cases of acute intestinal obstruction due to one or more of the different causes here enumerated.

(2) Strangulation from diverticula is usually met with in the ileum within three feet of the ileocæcal valve.

(3) Strangulation by normal structures abnormally attached.

Under this head the vermiform appendix may become fixed by its free end to the cæcum, ileum, ovary, or Fallopian tube. A Fallopian tube, or the mesentery and omentum, may form similar attachments and cause strangulation.

(4) Strangulation through slits or apertures takes place

through normal openings, as the foramen of Winslow, and also in accidental or traumatic slits, as in the mesentery, omentum, or broad ligament, the bowel becoming bent or kinked upon itself, and by compression, peritonitis, adhesions, and strangulation soon follow. This form of obstruction is almost invariably met with in the small intestine. Volvulus or twisting of the bowel is usually met with in the sigmoid flexure, and is caused by a long mesentery, with a narrow attachment, permitting rotation of a loop upon its own axis or upon its mesenteric attachment, or around an adjacent coil of small intestine.

Intussusception or invagination of the bowel wall into the lumen of an adjacent part constitutes nearly one-third of all cases of acute intestinal obstruction. Nearly all cases of obstruction in children are due to this cause. There are four varieties,—the ileocæcal, the colic, the iliac, and the ileocolic. The first variety is the commonest. Intussusception is due to active peristalsis—obstruction of the intestinal canal by foreign bodies. Gall-stones, enteroliths, fruit-pits, worms, and other foreign bodies cause obstruction in the ileum near the ileocæcal valve. Obstruction of the bowels from constriction due to cicatrization of ulcers, new growths, tumors, etc., will be excluded, as they all usually give a history of chronic obstruction for a considerable period before acute obstructive symptoms develop; neither do we include reflex ileus due to the impaction of a gall-stone in the cystic duct, or a calculus in the ureter, or the pressure of a tumor on an ovary, although each of these conditions may give rise to symptoms closely analogous to that of mechanical ileus.

*Symptoms.*—Mechanical ileus or acute intestinal obstruction is marked by a group of symptoms that are remarkably uniform if studied before they are masked by the administration of opium. These classical symptoms of acute obstruction of the bowels are pain due to rupture or tearing of the peritoneum by the constricting or compressing force, pain that is sudden and sharp in its onset, and distinctly paroxysmal in character, colicky pain due to the intermittent muscular contraction of the bowel wall, as each peristaltic wave beats against

the obstruction seeking to overcome it. These waves can be seen and felt and heard upon the proximal side of the obstruction in all cases where the abdominal walls are thin. They terminate at the point of obstruction, and are a guide to its location. The pain is usually referred to the region of the umbilicus at first, but soon becomes diffuse, and is relieved by pressure or compression. The abdomen is not tender at this stage. Eructation and vomiting soon begin; at first the contents of the stomach, then of the small intestine, and, if the obstruction is low down in the ileum or colon, stercoraceous vomiting follows in twenty-four to forty-eight hours. Distention of the abdomen is rapid and progressive, and its extent depends upon the location of the obstruction. The higher up it is, the less the distention, and in colonic or sigmoid obstruction the distention is sometimes enormous. Constipation is complete from the moment of the acute obstruction, although enemas may bring away a small amount of faecal fragments and gas contained in the bowel below the seat of obstruction. Symptoms of shock or collapse are usually present. The countenance is indicative of pain and anxiety, and soon becomes drawn and haggard; the extremities cold; the fingers blue; respiration shallow, and diaphragm stationary. Temperature is stationary, or may be subnormal; the pulse is small and rapid; urine is either diminished or suppressed.

*Diagnosis.*—We must differentiate mechanical ileus from ileus due to paralysis of the afferent nerve, vascular ileus, dynamic ileus, postoperative ileus, lead-colic ileus, adynamic ileus, septic ileus, paralytic ileus, reflex ileus, strangulated hernia, irritant poisoning, and perforative peritonitis. A careful consideration of the antecedent history enables us frequently to make an accurate diagnosis of the special variety of ileus in a given case, but too often the differential diagnosis is made by the aid of a laparotomy or a post-mortem section.

In ileus due to bands or adhesions there is usually a history of plastic peritonitis due to a hernia, a salpingitis, an appendicitis, or gall-stones, an ovariectomy, or some intra-abdominal operation that was followed by an abrasion of the

endothelial coat of the intestine, and adhesions to an adjacent loop, or to an uncovered stump or pedicle that directs our attention to compression from without. Postoperative dynamic ileus cannot be differentiated. In ileus due to compression of the bowel in a slit or opening, there may be a history of abdominal traumatism also.

In volvulus we have the age of the patient,—forty to sixty,—chronic constipation, and the enormous early distention of the abdomen, to guide us as to the location and probable cause of obstruction.

In intussusception we have the sudden onset of symptoms during infancy, childhood most frequently,—the characteristic tenesmus and desire to evacuate the bowels, the fæces consisting of simply mucus and then mucosanguinolent, with the marked exacerbations of peristalsis and pain, and the history of previous diarrhœa and excessive peristalsis. A lozenge-shaped tumor can be felt; obstruction from foreign bodies usually gives a fairly clear history of gall-stones, or the swallowing of fruit-pits, or the imbibition of magnesia and chalk for a long time, or obstipation.

*Treatment.*—Lavage of the stomach and rectal or colonic enemata are usually only palliative procedures in mechanical intestinal obstruction, although in intussusception cases are sometimes cured by large enemata of soapsuds or water when the patient is inverted, or the hips greatly elevated. Gaseous enemata also occasionally unfold the invagination, and both these methods should be resorted to in all cases of invagination seen during the first twelve hours before resorting to laparotomy. They may succeed in dynamic ileus also, but are usually useless in ileus due to compression of the bowel in a slit or opening, and are harmful in all cases of volvulus. Opium should never be administered. General practitioners, however, continue to use it, notwithstanding the warnings of surgeons as to its inutility and danger in masking the early symptoms that enable us to make an accurate diagnosis, and advise prompt surgical intervention as the only rational treatment in the vast majority of cases of mechanical ileus. The earlier a

diagnosis is made, and the earlier a laparotomy is done, the lower the mortality from resection or anastomosis. An artificial anus is rarely indicated in acute obstruction. In obstruction from neoplasms it is often a valuable preliminary operation to conserve the strength and nutrition of a patient before undergoing an enterectomy.

With earlier diagnosis, earlier surgical intervention, and better operative technique, the mortality has been steadily lowered, and will continue to be lowered still more. In pre-antiseptic operations the mortality of intestinal resection was 78 per cent., under antiseptic methods 53 per cent., and the statistics of 1900, 47 per cent.

As to the method of operating, the majority of surgeons prefer a median incision, although in cases where there is great meteorism and the obstruction is located at the cæcum, or in the right side of the abdomen, my preference is for an oblique incision extending to the right of the rectus muscle, as it brings more directly into view the seat of the obstruction; there is less handling of the bowels, and, if eventration does become necessary, the intestines are much more easily replaced. When the abdomen is opened, the distended and congested coils immediately appear in the wound, and, as our search must be made methodically and thoroughly, I usually push them aside and examine the cæcum; if it is greatly distended and dilated, I know that the obstruction is in the colon, and I make a systematic search along the ascending transverse and descending colon until I come to the seat of the obstruction. If I find the cæcum collapsed and a coil of collapsed small intestine lying in the pelvis, I know that the obstruction is higher up in the small intestine, and continue my search upward until I come to the point of obstruction. When found, the point of obstruction should always be brought outside of the abdomen, when possible, where a resection is necessary. When bands are found to be the cause of obstruction, we must not return the intestines and close the wound when the first point of compression has been relieved, for frequently there are more than one, and, if all are not relieved, the operation is a failure. In the case of

obstruction from foreign bodies, the obstructing mass is pushed along the bowel to a healthy point, and either crushed or the bowel is surrounded by moist gauze pads and incised, the foreign-body removed, and the incision closed by a Czerny-Lembert suture.

In volvulus the bowel is untwisted, and the mesentery shortened in a transverse fold, care being exercised that the angulation does not interfere with the vascular supply of the intestines. Where there is kinking of the bowel and strong adhesions, sometimes the most practical procedure is lateral anastomosis rather than resection. If in doubt about the viability of the strangulated loop, it may be brought outside the abdomen and treated with hot compresses, and watched for a day or two, after Hahn's method.

In laparotomy for intussusception, the invagination may be relieved by dragging the intussusceptum out of the intussusciens when the operation is done during the first twenty-four hours before the bowel wall is permanently damaged. Small necrotic areas of bowel, or lacerations of small extent, may be infolded by a Lembert suture. In some cases complete eventration is the quickest method of finding the obstruction, although much manipulation of the intestines is likely to be followed by adynamic ileus.

*Classification.*—In a recent communication to the New York Surgical Society, Gibson reported 1000 cases of acute obstruction and gangrenous hernia, divided as follows in regard to cause:

Hernia .....	354
Intussusception .....	187
Bands .....	186
Volvulus .....	121
Meckel's diverticulum.....	42
Gall-stones .....	40
Slits and openings. ....	34
Foreign bodies.....	16
Miscellaneous .....	20

He summarizes that the most frequent causes of intestinal obstruction are intussusceptions and bands. The mortality is 47 per cent.; the mortality of resection is 74 per cent.; the mortality of artificial anus is 77 per cent.

*Prognosis* depends upon (1) duration of obstruction; (2) extent and severity of changes in the bowel wall; (3) the nature of the obstruction and the ease or difficulty of the relief; (4) the promptness, judgment, and skill of the surgeon; (5) the patient's general condition.

# ILEUS CAUSED BY NEOPLASMS.<sup>1</sup>

By A. J. OCHSNER, M.D.,

OF CHICAGO.

My clinical experience with ileus due to neoplasms has been most unsatisfactory, from the fact that I have had a mortality of nearly 50 per cent. of all cases of this kind that I have operated, either from shock or sepsis, or continued obstruction of the intestines, and because of the fact that of all the cases that lived there were but two whose recovery I have not regretted. In other words, my efforts in giving these patients surgical relief have been successful (with two exceptions) only in the cases that did not recover. The same experience is found in the reports of a number of other surgeons,—Kroenlein, Madelung, and others.

From a scientific stand-point, however, the subject is interesting, but the limited time given to this paper will make it necessary to simply touch upon the important points.

*Pathology.*—The following varieties of neoplasms have given rise to ileus: carcinoma, sarcoma, myosarcoma, myoma, fibroma, lipoma, adenoma. Their frequency corresponds to the order in which they are given here.

The neoplasm has its origin in the intestine itself, or it originates in any one of the other intra-abdominal organs, and causes the obstruction by involving the intestine. I have operated upon patients suffering from ileus in whom the tumor originated in the ovary, the stomach, the pancreas, the omentum, the liver, and the mesenteric lymph glands.

Carcinoma of the intestine causing ileus is most common in the rectum; next in the sigmoid flexure of the colon; next

<sup>1</sup> Read at a Joint Meeting of the Chicago Surgical and the Chicago Medical Societies, December 5, 1900.



the splenic; next the hepatic flexure; next in the ileocæcal valve, and next to this in the duodenum.

Most of the cases of primary sarcoma, myoma, and myosarcoma that I have encountered in the literature occurred in the small intestine; while lipoma, adenoma, and fibroma are more commonly found in the colon.

Primary carcinoma gives rise to ileus only when annular, the obstruction being due both to contraction and to accumulation of carcinomatous tissue within the lumen of the intestine. Not infrequently the exciting cause of the ileus is the impaction of some undigested portion of food. In a case of carcinoma of the splenic flexure of the colon, I found an orange seed impacted; in a case of carcinoma of the sigmoid, an enterolith.

Ileus due to the other primary neoplasms of the intestines usually results from acute bending of the tube or intussusception or valve formation, because these tumors are usually spherical or pear-shaped, and cause obstruction by dragging upon the walls of the intestine.

Ileus due to secondary involvement of the intestine by carcinoma or sarcoma occurs most frequently through the inclusion of the sigmoid flexure in a sarcoma or papilloma of the ovary; but, as stated before, the invasion may occur from any one of the other intra-abdominal organs. In each case, of course, the origin determines the pathological structure of the neoplasm. In primary tumors the carcinoma is always of the glandular type; the sarcoma is most commonly of the spindle-celled variety.

*Diagnosis.*—Although the conditions which ultimately result in ileus due to neoplasm develop very slowly, the onset of the obstruction is usually quite sudden. The symptoms consist in the obstruction to the passage of gas, nausea, and, later, vomiting, the latter becoming more and more severe until it may become stercoraceous. Pain usually follows the administration of cathartics. Upon inspection of the abdomen, peristalsis of the small intestines will be observed, and it is this symptom which is of the greatest value. Percussion may

demonstrate an area of dulness corresponding to the location of the neoplasm. Early in the attack, before the abdomen has become severely distended with gas, it is often much easier to recognize this dulness than later on.

If the abdominal walls are thin, the growth can sometimes be palpated; although its most common locations—the upper end of the rectum, the sigmoid, the splenic and hepatic flexure—make this a very difficult task. If in the rectum, the tumor can be located with the proctoscope or by digital examination. Auscultation has been recommended because it is claimed that it is possible to follow the sound caused by the gas and fluid in the intestines to the point of obstruction, thus locating the neoplasm. I have succeeded several times in following this sound, but in each case the obstruction was at a different point from the one located by this method.

In a general way one may state that if the vomiting is severe directly after the beginning of the obstruction, the neoplasm is high up in the alimentary canal, and *vice versa*. The neoplasm can frequently be located by the history of pain in the region of the neoplasm for some time previous to the occurrence of the obstruction. This may be due to the irritation of ulcers which usually exist in the intestine above the location of the tumor. This fact has been of great value in a number of my cases.

*History.*—There is usually a history of chronic constipation. In some cases this is intermittent with attacks of diarrhoea. There are usually several acute attacks of obstruction, occurring especially when indigestible food has been taken, which pass away in a short time, before there is a severe attack. Quantities of mucus accumulate above the stricture, and this is evacuated from time to time, or may be evacuated daily for a long period of time. Many of these cases give a history of repeated evacuations of blood. It is rare to find portions of the tumor which have been torn loose and evacuated with the faeces. In one case, however, in a patient fifty-one years of age, with a carcinoma of the lower end of the sigmoid flexure, I was able to make a positive diagnosis in this way.

*Emaciation and Cachexia.*—In many of these patients there is progressive emaciation, and most of those that I have seen showed anæmia, if not cachexia.

*Age.*—These patients are usually over forty years of age, but a number of cases much younger have been reported: V. Babes and Nanu (*Berliner klinischen Wochenschrift*, 1897, No. 7), Felch (*Medical News*, 1896, No. 22), Demple (*Centralblatt für Chirurgie*, 1898, p. 640). One of my own cases occurred in a young man of twenty-eight years.

If the neoplasm involves several coils of intestines, which is quite common in secondary carcinoma, there is always long-continued increasing meteorism.

*Duration.*—Ordinarily, aside from chronic constipation, diarrhœa, and meteorism, which frequently exist in old patients for many years, distinct symptoms do not precede the final attack more than one year. In young patients the time between the first distinct symptoms and the final attack is usually only a few months.

*Differential Diagnosis.*—The following conditions have been mistaken for ileus due to neoplasm: Strangulated hernia; volvulus; intussusception; gall-stone impacted in intestinal canal; renal calculus impacted in ureter; ruptured ectopic gestation; vomiting of pregnancy; strangulation of a loop of intestine underneath a band of adhesions or a Meckel's diverticulum; fæcal impaction; appendicitis; pyosalpinx; ileus due to ovarian cyst with twisted pedicle.

(1) *Strangulated Hernia* should be eliminated by a careful examination of the umbilical, inguinal, and femoral openings.

(2) *Volvulus* usually follows an injury, and is mostly very sudden and violent in its onset.

(3) *Intussusception.*—The same is true of intussusception, and in this condition there is usually a long sausage-shaped mass in the abdomen, which increases in length, and its occurrence immediately precedes the attack.

(4) *Impacted Gall-stones.*—I have seen but three cases of impaction of gall-stones in the intestinal canal, and in but one

of these was it possible to make a probable differential diagnosis before the abdomen was opened, because no history of biliary colic, or jaundice, could be elicited; in the other two cases the attacks came on during apparently good health.

(5) *Renal Calculi*.—In a few cases I have seen complete intestinal obstruction in connection with the passage of a renal calculus. The pain radiating down towards the bladder, the irritability of the latter, the presence of blood in the urine, and the history of the case, usually serve to differentiate these cases.

(6) *Ectopic Gestation*.—The history of these cases and the local examination make this diagnosis practically certain.

(7) *Strangulation under Adhesions or under a Meckel's Diverticulum*.—This condition is so violent and sudden in its onset that it can usually be easily diagnosed.

(8) *In Fæcal Impaction* there has in my experience never been complete obstruction to the passage of gas.

(9) *Obstruction due to Appendicitis or Peritonitis accompanying Pyosalpinx*.—These conditions are so plainly marked in their onset as inflammatory conditions, that it is rarely difficult to differentiate. In one patient, a very fleshy woman fifty-eight years of age, I found difficulty in making a positive diagnosis. She had suffered from constipation for years; had experienced some gnawing pain at a point about an inch to the right of the umbilicus and a little higher up. She was suddenly taken very ill, with a slight temperature, a high pulse, complete intestinal obstruction, and a perceptible mass in the most painful region. There were nausea and vomiting. The long-continued pain and the constipation might have been due to the development of a carcinoma, or to adhesions. The acute attack might have been due to a severe attack of appendicitis, or to a complete closure of the lumen of the annular carcinoma, and the pressure of gas upon the ulcerated intestine above. In short, all the conditions could have been ascribed to either cause. I made an abdominal section and found a perforated appendix surrounded by old and recent adhesions, which in turn were surrounded by omentum and intestines.

(10) *Vomiting of Pregnancy*.—In vomiting of preg-

nancy, the history is usually sufficiently clear to establish a diagnosis.

(11) *Twisted Pedicle of Ovarian Cyst.*—The onset is usually exceedingly violent, and a tumor of considerable size can be distinguished, although, in a woman sixty-two years of age, with an exceedingly thick abdominal wall, in whom this condition existed, I could not be positive in the diagnosis.

*Treatment.*—In case the diagnosis is reasonably certain, so that a strangulation can be excluded, there is usually no necessity for haste, because the condition does not get worse rapidly, unless the pressure from above is increased by the administration of food or cathartics, both of which should be prohibited in every form of ileus. If the abdomen is greatly distended with gas and fluid, making an operation very tedious, and consequently liable to give rise to shock, it is best to spray the throat with a 2 per cent. solution of cocaine, and then to perform gastric lavage; this will favor return peristalsis, and by repeating this two or three times it is often possible to reduce the distention to a very marked extent. The foot of the patient's bed should be kept in an elevated position for some time in order to facilitate the regurgitation of intestinal contents into the stomach. These patients frequently feel so much better that they will clamor for more food, only to relapse into their former condition upon taking it.

As soon as the abdominal distention has been disposed of, and the patient feels the effects of this, it is well to operate. On the other hand, if, notwithstanding the gastric lavage and the prohibition of all food and cathartics by mouth, the patient's condition does not improve, an operation is indicated. I believe it is important to distinctly bear in mind the vital difference there is between these cases and cases in which the obstruction is due to strangulation, because in the former not so much is lost by delay, nor so much gained by an immediate operation. For the same reason an immediate operation is indicated in any case in which it is not possible to make a differential diagnosis between these two conditions.

*Operation.*—The patient should be placed in the Tren-

delenburg position, with the head dependent, as advised by Roser, in order to prevent inspiration of intestinal contents in case of regurgitation during the operation, and gastric lavage should be employed before the patient is anæsthetized.

*Incision.*—If it is possible to determine the location of the neoplasm, either from the history or from the examination, the incision should be made as nearly over the seat of this as is possible, without interfering unnecessarily with the anatomical structures of the abdominal wall. The incision may be made in the median line or longitudinally through either rectus muscle; or McBurney's intermuscular incision may be made on either side in the inguinal region; or the same principle may be employed in opening the abdomen in the hypochondriac region on either side, especially for the purpose of approaching a carcinoma in the splenic or hepatic flexure of the colon; or the semilunar line may be chosen on either side. Whenever the location of the tumor cannot be determined with reasonable certainty, it is best to choose the median line.

*Locating the Tumor.*—After opening the abdomen, it is best to insert the hand and examine the region in which the growth is suspected. If one is not successful, it is best to proceed to search the alimentary canal in a systematic manner. If the intestines are greatly distended with gas and fluid, a loop of intestine should be brought out of the abdominal incision; a circular purse-string stitch of silk should be carefully applied to the convex surface of the intestine, grasping all of the layers down to the mucous membrane. This portion of the intestine should then be emptied by forcing its contents in either direction, which can be done by stripping the intestine between the finger and thumb. An assistant is instructed to hold this; then an incision is made through the intestine within the purse-string stitch, and a long glass tube, half an inch in diameter with a turned-out edge, is slipped into this opening; then the purse-string is drawn tightly and tied in a loop which can easily be united. This portion of the operation is usually performed too hurriedly, and, as a result, the drainage which is accomplished is not satisfactory. It is much

better not to permit any of the other loops of intestines to escape from the abdominal wound, because the pressure of the abdominal walls upon the intestines favors the expulsion of gas and fæces. It may be necessary to add some manipulations to the abdominal pressure; but if the other intestines are not permitted to escape from the abdominal wound, the intestinal contents are usually readily evacuated by way of the drain, as described. If this has been successful, it is best to untie the silk stitch, withdraw the glass tube, turn in the edges of the wound in the intestine, tie the stitch, and enforce it with a few additional Lembert stitches. It is then usually possible to determine whether or not the colon contains gas and fæces. If it does, the obstruction is low down; if it does not, the obstruction is high up.

In the former case one must look for the obstruction below the distended portion of the colon; in the latter case, above the collapsed portion of the gut. One saves time by following the intestine from end to end. If the growth is in the intestine primarily, and there are no lymphatic glands involved, the intestine should be resected at least three inches above and below the tumor, provided the patient's strength seems to be sufficient to warrant this; otherwise, a short circuit should be made and the tumor removed at a later operation.

If the lymphatic glands are involved, it is best simply to make a short circuit by lateral anastomosis.

In case of resection of the small intestine, either the Murphy button or the needle and thread may be used with equally favorable results. After resecting the large intestine, it is best to make an anastomosis with the needle and thread.

If the tumor is in the upper end of the rectum or the lower end of the sigmoid flexure, the method of excising the tumor, then drawing down the lower end through the anus and drawing the upper end down through this and suturing the two ends outside, as described recently by Robert Weir, seems a most useful method.

If the obstruction is below the ascending colon, it is

always best to make a temporary colostomy, and to postpone the radical operation, unless the patient is in a favorable condition. These patients gain very rapidly in strength after the obstruction has been relieved in this manner. If the obstruction is in the small intestine, and the patient is not in condition to bear any operation beyond an enterostomy, this may be done; but the result in these cases is usually unsatisfactory, because the patient is likely to die of starvation.



# FISSURE OF THE HEAD OF THE RADIUS.<sup>1</sup>

By CARL BECK, M.D.,

OF NEW YORK.

ISOLATED fracture of the head of the radius is regarded as rare. If the fragment is entirely severed, it will be recognized as a separate piece of bone by palpation. In addition, it will not share the motions of the arm, while alternately turned in pro- and supination, and in that case crepitus is seldom absent. Intense pain may point to the seat of the fracture; and sometimes it may be guessed by simple inspection, the biceps drawing the shaft forward and causing a slight projection.

But whenever there is entire absence of displacement, contusion or distortion may be thought of. This error is apt to take place so much easier, when the swelling soon following the injury veils the symptoms, abnormal mobility especially not being noticeable. In former years it was only under anæsthesia that such cases were once in a while properly diagnosed.

It is evident that the diagnosis of fissure of the radial head is still more difficult. It seems to me, indeed, that until recently its presence could never be clearly ascertained. Fortunately, the Röntgen rays throw light on this subject as well as on many others, and there can be no doubt that, with our increasing knowledge and experience, fissure of the radial head will also be recognized more frequently.

The following case may serve as an illustration: it is one which in the pre-Röntgenian era would surely not have been recognized as a fissure of the radial head.

<sup>1</sup> Case presented to the Surgical Section of the New York Academy of Medicine, January 14, 1901.

FIG. 1.—Fissure of radial head forty hours after the injury.

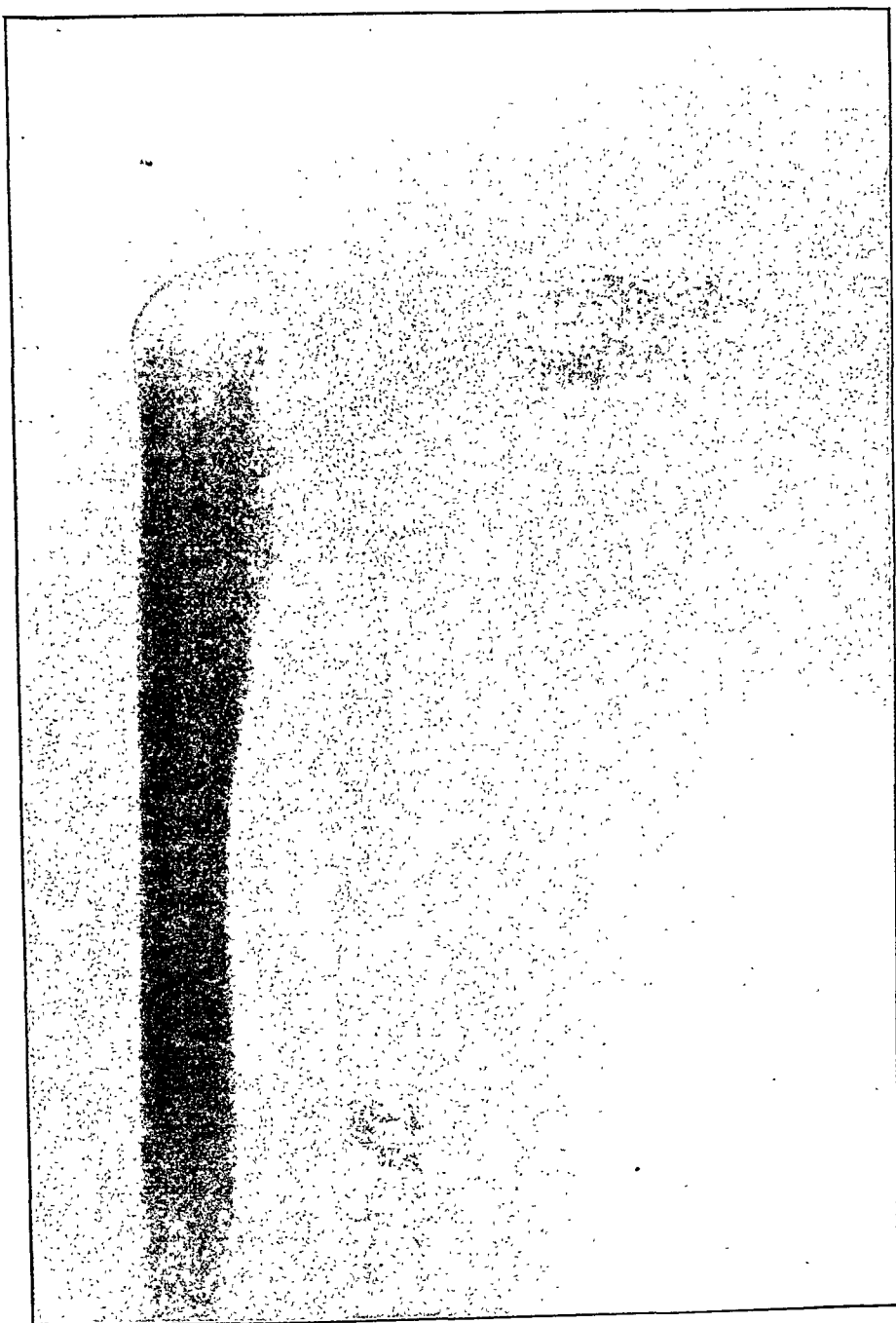
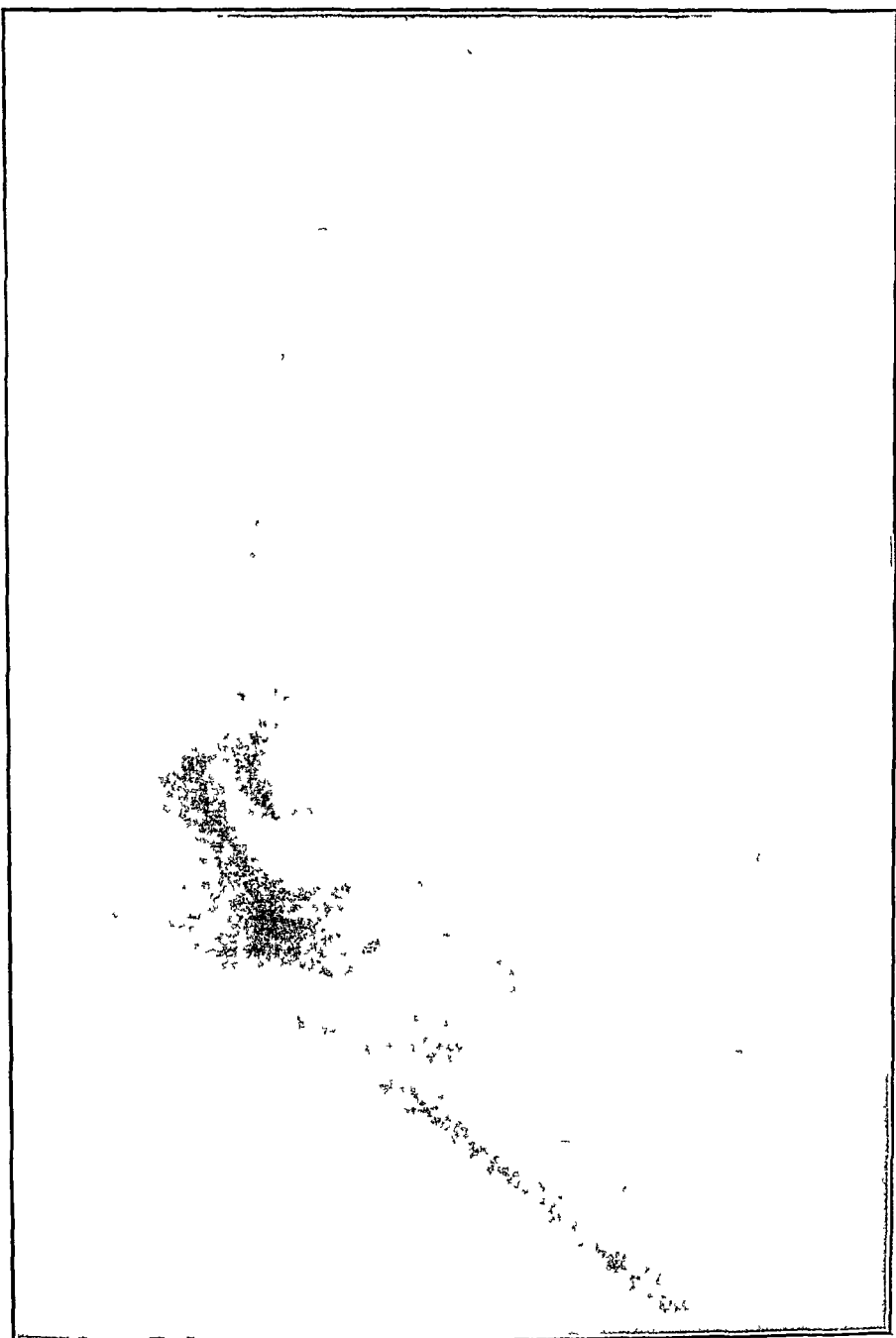




FIG. 2.—Fissure of the radial head, showing ideal union four weeks after the injury.





A girl of twenty-four years of age, on the evening of October 4, 1900, in falling downstairs, struck her right elbow against a piece of iron projecting from the stairway. She called upon a physician at once, who found the elbow much swollen and painful. No signs of a fracture were then detected.

On October 6, when I saw the patient for the first time, the arm was in right-angled flexion, and the region of the elbow-joint showed considerable swelling and tenderness equally distributed. The area above the radial head showed the presence of ecchymosis.

A skiagraph was taken at once in supination, the patient lying on her back. It revealed the presence of fissure of the radial head beyond any doubt. There were, in fact, two distinct fissure lines, one running through the *circumferentia articularis* alone at its external margin, and the other one creating a triangular segment, the base of which was formed by the internal margin of the *circumferentia articularis* and the tip by a splinter detached from the radial neck. (Fig. 1.)

The therapy consisted simply in the application of a plaster-of-Paris dressing in rectangular flexion, the forearm being kept in semipronation. A second skiagraph (Fig. 2), taken four weeks later, shows ideal union, the external portion of the *circumferentia articularis* only protruding farther than it should normally. Fig. 2 also shows how quickly the evidence of the presence of a fissure becomes lost if there be perfect approximation, a circumstance to be borne well in mind from a medicolegal stand-point.

The function of the forearm did not become perfect until three months after the injury, the joint showing considerable stiffness at first, which yielded gradually to massage treatment.

Fissure of the radial head being of a decidedly intra-articular character, an effusion in the joint is a natural sequence, which explains the uniform swelling at the beginning as well as the stiffness at a later period.

From the observation of this case we may learn that wherever skiagraphic observation shows no tendency to displacement, it will be advisable to begin motion at an early stage, say after ten days, in fissure as well as in fracture of the radial head. In relying on the skiagraphic Mentor our results will be far superior to those of the past. Even in the much-

feared cases of fracture of the radial head, where the fragment is considerably displaced, a great deal can be done, or rather prevented, under the guidance of the rays.

In the case of a man of thirty-two years of age I had an opportunity to diagnose a fracture of the radial head before I employed the Röntgen rays. This was easy because the much displaced fragment was freely movable. It had seemed to me that I had succeeded in reducing the fragment, but a skiagraph taken twelve hours after the injury, through plaster-of-Paris wire splint, showed that the reposition was not perfect. Anæsthesia enabled me then to correct the displacement perfectly in the half-extended position. (See the author's book on "Fractures," Figs. 64 and 65.) The result was very satisfactory.

Immobilization should be kept up for weeks in such cases, for premature contraction of the biceps muscle might separate the replaced fragment. If the fragments are not properly retained in place, the production of extensive adhesions might demand resection of the radial head. The same operation might be indicated if small fragments separated from the cartilage remain detached and act like forcing bodies, so as to disturb the function of the elbow. The Röntgen rays enable us, in the event of this rare necessity, to trace out the mode of such operations definitely beforehand.

# EXCISION OF THE CERVICAL SYMPATHETIC GANGLIA FOR EXOPHTHALMIC GOITRE.

By J. SHELTON HORSLEY, M.D.,

OF EL PASO, TEXAS.

EXOPHTHALMIC goitre is a disease whose etiology, pathology, and treatment are still in an unsettled condition. It has been a mooted point among some whether any drug possesses a decidedly beneficial influence in this affection. Others, who favor therapeutic agents, are by no means of one opinion as to what drug is efficient, though it is generally agreed now that any preparation of the thyroid gland is contraindicated. As to the pathology, we are probably justified in assuming that in this disease there is nearly always an excess of thyroid-gland secretion. But whether this excess stands in a causal relation to the exophthalmos and the cardiac symptoms, or whether it is merely coincident, is still *sub judice*. The preponderance of evidence, however, together with more recent experimental work on this subject, seems to favor the latter view. According to this theory, the whole complex group of symptoms relating to the eye, heart, and thyroid gland is the result of a derangement of the central sympathetic centres.

Dr. Alfred Gordon (*Philadelphia Medical Journal*, Vol. v, pp. 1384-1425) has ably sustained this view as against the hyperthyroidization theory. He quotes the fact that a number of competent observers have seen cases of exophthalmic goitre without struma; that experimental irritation of the central sympathetic centres produces all symptoms of this disease; that Tillaux (*Rev. Intern. de Méd. de Chir.*, 1895, p. 305) observed exophthalmic goitre in a patient upon whom he had done a thyroidectomy four years previously. Gordon also



calls attention to cases cured by ovariectomy and other operations that could not have diminished the thyroid secretion, but must have acted through the nervous system. He cites the fact that experimental hyperthyroidization produces none of the symptoms of exophthalmic goitre, except the rapid heart.

It is, then, upon this theory of derangement of the sympathetic centre that excision of the cervical ganglia is based. The idea is to interrupt permanently morbid impulses from the sympathetic centres in the medulla. The history of this operation has been given by Dr. James Moores Ball, of St. Louis, in two articles (*New York Medical Journal*, Vol. lxx, p. 17, and the *Journal of the American Medical Association*, Vol. xxxiv, p. 1384). Though it has been performed by a number of continental surgeons, Professor Jonnesco, of Bucharest, has had by far the largest experience in this work, and has been its most enthusiastic advocate. In a series of ten cases operated upon by him for exophthalmic goitre, six were absolutely cured, and four greatly improved. Other operators, as Jaboulay, Schwartz, Gerard-Marchant, have obtained almost as good results. This seems so far in advance of anything obtained by other known methods of treatment that the operation deserves our most serious consideration. Of course, it is too soon, and the number of cases are too few, to pronounce final judgment; yet this much seems certain, that beneficial results are obtained by this procedure when by other means they were unattainable.

The following case, so far as I have been able to ascertain, constitutes the first operation for excision of the sympathetic cervical ganglia for exophthalmic goitre done in America.

Mrs. A. R., aged twenty-six years, Mexican, family history of no significance, has had no children, but several miscarriages. Previous health good, without symptoms of any gynæcological trouble. About February, 1900, she first noticed frequent cardiac palpitation and some exophthalmos. These symptoms rapidly increased. The case was kindly referred to me for operation by Dr. M. P. Schuster, in August, 1900. The exophthalmos was then

marked; thyroid gland considerably enlarged, and pulse varied from 120 to 140. She complained of a disagreeable throbbing in the neck and of cardiac palpitation. Up to this time she had been treated with various drugs, chief reliance being placed in arsenic, but she continued to get worse. On August 6 she was admitted to the hospital, and the following day I operated with the assistance of Dr. Schuster and Dr. H. T. Safford, the latter giving the anæsthetic. Dr. H. H. Stark, Dr. Howard Thompson, and Dr. M. O. Wright were also present. Chloroform was used. An incision of about four inches was made on the right side of the neck downward from the tip of the mastoid process, the lower part of it being behind the sternomastoid muscle. The fascia just in front of the anterior tubercles of the transverse processes of the second, third, and fourth cervical vertebræ was reached. Considerable difficulty was experienced in identifying the ganglia, the middle one having numerous communications, and the superior being abnormally high. I had previously rehearsed the operation three times on cadavers, and each time was impressed with the irregularity in appearance and connections of all the cervical ganglia, particularly the middle. The middle and the superior ganglia were finally identified and removed. On account of the patient's condition, and particularly because of the rapidity of her pulse, no attempt was made to extirpate the ganglia on the left side, though this had been my intention. We closed the wound with subcuticular catgut sutures. Considering the unusual heart action, chloroform was most skilfully administered. During most of the time the pulse, though too rapid to be counted accurately, varied between 170 and 200, except on two occasions during the later stages of the operation, when for about a minute it suddenly dropped to 72, but immediately recovered its former rate. This was probably due to irritation of the pneumogastric by unconscious traction upon it. Four hours after the operation, the pulse was 160 and temperature 104° F., and six hours later the pulse had dropped to 140. Vomiting now set in and continued at intervals for twenty-four hours. The following morning the patient was more comfortable, with pulse 110 and temperature 100°. She improved rapidly from this time, the wound healing by first intention. August 12 she left the hospital with pulse of 92. She voluntarily expressed great relief from the throbbing which had previously been so annoying. On December 27, 1900, her pulse

was 90. She complained of occasional pain on the right side of the head and face. She has gained in weight, and has had no return of the throbbing or palpitation since the operation. The exophthalmos has markedly diminished, though there is but little decrease in size of the thyroid gland. She feels well and is in good health. A keloid growth has developed in the scar.

The case may be recorded as one greatly improved. If she does not continue to progress favorably, I shall advise extirpation of the left cervical sympathetic ganglia.

# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, December 12, 1900.*

The Vice-President, FREDERICK KAMMERER, M.D., in the Chair.

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## ILIAC ANEURISM; EXTIRPATION.

DR. GEORGE E. BREWER presented a man, aged forty-six years, who was admitted to the Roosevelt Hospital, in August last, suffering from a painful pulsating tumor of the left groin. Fifteen years before he contracted syphilis, followed by various cutaneous eruptions and moderate alopecia. Two years ago he first noticed a small lump in the left groin, which was not painful or tender. Shortly after that it was felt to pulsate. The tumor gradually increased in size, but, up to two months before admission, did not cause any marked inconvenience. At that time he noticed shooting-pains in the leg, and a disagreeable sense of throbbing, on exertion. Later, there appeared an œdema of the foot, which has gradually increased in amount and extent.

A few days before admission, the pain was so severe that he was obliged to give up his work. On examination, his general physical condition was fair, old syphilitic scars on the lower legs, and a presystolic and systolic murmur of the apex, with an accentuated second sound of the heart. There was an oval swelling in the left groin, almost filling the space between the anterior superior spinous process and the spine of the pubis, reaching about three or four inches above and from one to two inches below Poupart's ligament. The tumor was fairly well defined below, but above seemed to fade off into the deeper parts without any distinct line of demarcation. On palpation, distinct expansile pulsation was present. The sensation imparted to the hand, at one point, suggested the presence of only a thin wall of tissue between the skin and blood current. Auscultation revealed a loud systolic murmur synchronous with heart-beat. No impulse on coughing. Skin movable. No pulsation in posterior tibial

artery. Leg œdematous and cold; superficial veins enlarged. Temperature, 99.2° F.; pulse, 112.

Under ether anæsthesia, an incision was made midway between the anterior superior spinous process and the umbilicus, parallel with the fibres of the external oblique muscle. The muscular fibres were then separated without division down to the peritoneum, which was retracted from the iliac fascia until the common and external iliac arteries were exposed. The latter was easily ligated with chromicized catgut and the wound closed in the usual manner. The entire leg was then enveloped in cotton batting and bandaged, and the patient placed in bed.

Practically, no reaction followed the operation. The wound healed primarily. The evidences of circulatory disturbance in the leg were remarkably light, the foot seeming warm and well nourished from the first. Twenty-three days later, the patient was again anæsthetized, and a vertical incision made over the entire extent of the tumor. The femoral artery, issuing from the lower extremity of the aneurism, was ligated; afterwards, the profunda and its several branches, together with the superficial epigastric and circumflex iliac and superficial external pudic.

The walls of the aneurism were then carefully separated from the vein and nerve, and the entire sac removed. The incision was then closed with silkworm gut, and the same dressings were applied. Following this operation, there was a considerable lowering of the temperature of the foot and leg, and other evidences of impaired circulation.

The patient remained in bed for about three weeks, at the expiration of which time, the wound being primarily united and the patient free from pain, he was allowed to sit up for an hour each day.

It is now three months since his last operation, and he is able to do a full day's work.

## GUNSHOT WOUND OF THE ABDOMEN; ELEVEN PERFORATIONS OF THE INTESTINE; DOUBLE RESECTION.

DR. BREWER presented a colored man, aged thirty-three years, who was admitted to the Roosevelt Hospital, shortly after midnight in May last, suffering from a gunshot wound of the abdomen. It was learned that he had been shot about one hour

before by a companion, with a 32-calibre revolver, at close range. On examination, his pulse was 130, temperature 100.8° F., respiration 30. Evidences of hæmorrhage, with moderate shock. The wound of entrance was seen one inch to the right of the umbilicus. There was no distention, but the evidences of free fluid in the abdominal cavity were present.

He was immediately prepared for operation. Under ether anæsthesia, an incision about fifteen inches in length was made just to the right of the median line. On opening the abdominal cavity, a large amount of free blood, mixed with intestinal contents, escaped. Numerous coils of small intestine immediately presented, showing a number of perforations. These were sutured with fine black silk as they presented, after which the small intestine was withdrawn and other wounds found, which were similarly sutured. In two places, about eighteen inches apart, the intestine and its mesentery were so injured that resection had to be performed. This was done; about three or four inches of intestine, with a V-shaped portion of mesentery, were removed in both instances, and the intestinal wounds united with two Murphy buttons. The entire small intestine was then removed from the abdomen and carefully inspected, also the large intestine and stomach. A very large amount of clotted blood was present in the pelvis and in both flanks. This was removed with large gauze sponges, and the entire cavity of the abdomen irrigated with hot salt solution.

During these manipulations, the condition of the patient became extremely critical; and, after vigorous hypodermic stimulation, a large infusion of hot salt solution was made into the median cephalic vein. He was removed from the table in a condition of profound shock, and shortly afterwards another large saline infusion was given.

Vomiting of fæcal matter occurred, continuing more or less for two days, and was finally relieved by frequent stomach lavage. At the end of this time the vomiting ceased, and he began to show substantial improvement. The bowels were moved on the third day, and the pulse and temperature fell to normal on the sixth day. The first button passed on the ninth day; the second, on the fifty-fifth day, and the abdominal wound united by first intention.

DR. HOWARD LILIENTHAL said the case recalled an article

he had read upon the subject of gunshot wounds of the abdomen in negroes. In this article, which was written by a Southern surgeon whose name he had forgotten, the writer stated that the percentage of deaths after gunshot wounds of the abdomen was lower among the colored race than among the white. His explanation for this was that when the negro is well fed he remains lethargic and peaceable, whereas, when he is hungry, he is more apt to become quarrelsome; and if he is shot in the abdomen, his intestines are empty, and his chances of recovery are better than those of a man whose intestines are perforated when they are filled with food. It appears that in Dr. Brewer's case, in spite of the numerous perforations, very little intestinal material escaped.

DR. GEORGE WOOLSEY said that Dr. Lilienthal's remarks reminded him of a case of gunshot wound of the abdomen in a white man which he presented to the Society a few years ago. In that case there were sixteen perforations of the gut; four of them were so close together that it was necessary to excise a portion of the intestine, as Dr. Brewer had done in his case. Dr. Woolsey said that his patient had eaten no food for twenty-four hours at the time he was shot, and the intestines were practically empty. To this fact, the speaker said, he had partly attributed the patient's recovery from the operation. Another important factor in these cases is the personal equation, some persons being much less liable to infection than others.

### PROSTATECTOMY BY ALEXANDER'S METHOD.

DR. JOHN ROGERS presented a man, seventy years old, who was admitted to St. Francis's Hospital in May, 1900. His urinary symptoms dated back for two years. They consisted principally of retention and pain, and for a few weeks previous to his admission there had been an overflow of urine. He could only be catheterized with a great deal of difficulty. The prostate was much enlarged; it occupied a large part of the pelvis, and on the left side the posterior border was beyond the reach of the examining finger.

Prostatectomy was done by the Alexander method, an incision being made above the pubes, and a second through the perineum; the latter being the usual incision resorted to in external

urethrotomy. The case presented no particular difficulties, and the result has thus far been excellent. The man can now pass his urine without any trouble, and the prostate is apparently perfectly normal.

Dr. Rogers stated that the suprapubic incision adds greatly to the ease and safety of prostatectomy, and by adopting Gibson's device of inverting the bladder, the wound closes very readily. The speaker said that in one of his cases the suprapubic fistula resulting from the usual operation remained for some time, while in another case, by inversion of the bladder wall, the wound closed within three days. The enucleation of the hypertrophied prostate through the perineum is simple if it is done in the proper fashion, but it becomes extremely difficult if it is not. The success in this case was mostly due to the advice and assistance of Dr. Alexander.

In reply to a question, Dr. Rogers said the man had no residual urine at the present time, and the urine was perfectly clear.

DR. ALEXANDER B. JOHNSON said that while the result in the case shown by Dr. Rogers, as well as in many other similar cases, was excellent, he failed to see the necessity of opening the bladder above the pubes in combination with an incision through the perineum. Through a curved perineal incision the capsule of the hypertrophied prostate can be readily incised, and most of the gland removed without wounding the urethra at all. A suprapubic incision down to the bladder, not through it, rendered counterpressure easy during enucleation.

DR. WILLY MEYER said that in one case of suppurating prostate which had recently come under his observation, he was able, with comparative ease, to shell out the diseased gland through a transverse perineal incision. He preferred this incision to the median one. In the case referred to the gland was much enlarged, and the patient's symptoms of absolute retention dated back many years. He was an absolute catheter slave. The removal of the prostate was accomplished without tearing the urethra, and the patient made a good recovery. Subsequently, however, the old-standing pyelitis got worse, and the patient after many months succumbed. In two other cases of prostatic abscess in cases with enlarged gland observed several years ago, Dr. Meyer said he simply opened the prostatic abscess



without removing the gland, and the patient made a complete recovery. With regard to prostatectomy in cases of prostatic abscess of this kind, he deems it wiser, first, to cure the abscess and remove the gland at a second operation.

When the hypertrophy of the prostate is fibrous in character, the speaker said, prostatectomy is indicated; but in those cases where it is soft or semisolid, Bottini's operation is preferable. The difference in the character of the hypertrophy is an important factor in the treatment of these cases.

DR. LILIENTHAL said that when prostatectomy was indicated, he was in favor of making an incision above the pubes at least large enough to admit the finger, so that the possible presence of a stone or pedunculated middle lobe could be made out. In the latter case, it would be no use trying to remove it through a perineal incision. This information regarding the presence or absence of a pedunculated middle lobe may also be gained by means of the cystoscope; and after it is obtained, we can decide whether to do Alexander's operation, or that of Fuller, which is very satisfactory, especially in lean patients.

DR. ROGERS, in closing, said he fully agreed with Dr. Lilienthal regarding the utility of a suprapubic incision in these cases. The curved incision above the pubes suggested by Dr. Johnson is more apt to open up the cellular spaces in that region and invite infection. As regards the distinction made by Dr. Meyer between hard and soft prostates, Dr. Rogers said he believed that the method he had described could be done as well in one class as in the other. In all these hypertrophied prostates there is a line of cleavage which can be found if it is properly sought for, and when it is once found, enucleation is easy.

## NEPHRECTOMY FOR TUBERCULOSIS.

DR. F. TILDEN BROWN presented three patients, saying that his main purpose in presenting them was to contribute towards the solution of the question raised at the last meeting in the discussion attending Dr. Murray's case of vesical tuberculosis, viz., Shall such cases be treated surgically or climatically and with medicine?

Two of his cases were operated on two years and the other sixteen months ago. Although tubercle bacilli are no longer

found in the urine of any, still, in two of the cases the subjective symptom of frequent urination persists. He invited discussion in regard to what the present state of these patients would probably be had the operation been withheld and climatic with hygienic measures employed. Although in these individual cases such a course was not possible. In view of the absence, to-day, of tubercle bacilli in the urine of these patients, he thought that suitable irrigation would benefit the vesical irritability in the two cases showing it. They have had no such treatment since the operations.

The first patient was a woman, thirty-five years of age, who came under his observation in October, 1898, suffering from symptoms supposed by her physician to indicate a renal calculus. For two years she had been troubled by aching in the left lumbar region and in the back after exercise. This she felt in some measure every day, and it was increasing in severity. In August, 1898, during a three days' trip at sea, she had experienced persistent vomiting, preceded by a three hours' lasting severe pain in the left side. Since that time she had frequent repetitions of such paroxysms of pain, lasting from twenty minutes to three hours, sometimes accompanied by nausea, sometimes by vomiting. The pain always began at a point two inches to the left of the umbilicus and midway between the costal border and the iliac spine; thence it radiated towards and below the last rib. In two months she lost twenty pounds in weight. There were no subjective urinary symptoms, but in the urine tubercle bacilli were found both by the reporter and by Dr. Sondern. Neither kidney was palpable, but pressure over the left kidney elicited some tenderness, not felt on the other side.

The result of Dr. Sondern's analysis of the two specimens of urine from the ureteral catheters, together with that of the mixed urines from the bladder, is as follows:

Right Kidney, by Ureter Catheter.	Bladder.	Left Kidney, by Ureter Catheter.
	Amount in twenty-four hours, 720 cubic centimetres.	
Reaction, acid.	Acid.	Faintly acid.
Specific gravity, 1010.	1021.	1001.
Albumen, none.	0.5 per cent. by weight.	Trace.
Bile, negative.	Negative.	Negative.
Sugar, negative.	Negative.	Negative.
Indican, negative.	No excess.	Negative.
Urea, 1.4 per cent.	2.3 per cent.	0.1 per cent.
Blood, none.	Very small amount.	Very small amount.
Pus, none.	Marked amount.	Fairly marked amount.
Mucus, none.	Small amount.	Small amount.
Casts, none.	Some hyaline and finely granular casts.	Some hyaline and finely granular casts.
Bacteria, no tubercle bacilli found.	Some characteristic groups of tubercle bacilli.	Numerous characteristic groups of tubercle bacilli.
Epithelium, some round cells and groups, probably of ureter.	Some bladder-cells and groups, presumably of renal pelvis.	Numerous groups, presumably of renal pelvis.
Crystalline and amorphous deposits, none.	Small amount of uric acid.	Moderate amount of uric acid and sodium ureter casts.

One of the remarks made by the examiner is, "The presence in the bladder specimen of an amount of albumen in excess of what is seen in the specimen obtained from the left kidney is worthy of note and difficult to explain. While some of this difference is possibly due to nerve influence as the result of the catheterization, as observed in other elements of the urine, it is, however, so marked as to be seriously worthy of note."

Right kidney, nothing abnormal; bladder, except for unusual amount of albumen, no evidence of any lesions; left kidney, tuberculous pyelonephritis, with suspicion of uric acid stone or gravel.

The diagnostic conclusion of Dr. Sondern's full analysis was, right kidney shows nothing abnormal, left kidney shows tuberculous pyelonephritis plus a suspicion of uric acid stone or gravel.

The patient entered the Presbyterian Hospital, November 21, 1898; where, under observation for five days, her temperature ranged between normal and subnormal. The average daily excretion of urine was twenty-six ounces.

On November 26, 1898, under chloroform anæsthesia, Dr. Brown made a left extraperitoneal nephrectomy. After separate ligation of the vessels with chromic gut, the kidney was turned out with ureter attacher, and as much of this as the wound

would permit (about six inches) was removed, where the ureter appeared to be of normal size and consistency. The wound was closed without drainage.

Since the operation she has never had any recurrence of the left side pain. In fact, she expresses herself as being now in excellent health.

The specimen showed a comparatively early stage, or but moderate degree of tuberculous disease. (See plate opposite page 228.) One small necrotic lesion was found involving the apex of one pyramid, and its particular calyx had numerous tubercles as well as some in the pelvis. And the ureter at its junction here was greatly thickened in the tissues surrounding the mucous membrane, while the latter was well studded with tubercles. By this combination it was easy to believe that an œdematous obstruction to the outflow of urine might at times occur and give rise to the symptoms which had quite strikingly suggested stone to those who had seen her in attacks. For the first twenty-four hours after operation, twenty-five ounces of urine were passed, the daily average for ten days being thirty-four ounces. The highest temperature recorded was 100° F. For thirty-six hours after operation vomiting was quite persistent, but relieved for brief periods by lavage. She was discharged in good condition at the end of four weeks. That winter she spent at Saranac, where for six weeks a small sinus, starting probably from a deep chromic suture, caused her some trouble.

The second patient was a man, thirty-two years of age, who came under observation in August, 1899. He had considered himself perfectly well until early in 1899, when he began to suffer from vesical irritability to such a degree that he entered a hospital and was subjected to bladder irrigation, and to salol and ichthyol by mouth, with much benefit. When seen by Dr. Brown, he had not lost weight, had never seen any blood in his urine, but he had a pretty severe and constant aching in the right lumbar region and back, with sometimes a little pain in the right testicle. If he delays responding to a call to urinate, he has pain in the bladder, and then in the urethra during micturition.

Examination of the urine revealed the presence of tubercle bacilli. The cystoscope showed moderate hyperæmia over the central trigonum; the mouth of the right ureter was high up and involved in a narrow zone of congestion upon catheterizing the

ureters, ten cubic centimetres of very light urine came from the right catheter in twenty-five minutes; from the left nine cubic centimetres collected in eighteen minutes. Analysis of the various urines by Dr. Sondern gave the following results:

Right Kidney, by Ureter Catheter.	Bladder Specimens.	Left Kidney, by Ureter Catheter.
Reaction, acid.	Acid.	Acid.
Specific gravity, 1004.	1006.	1018.
Albumen, trace.	Trace.	None.
Bile, negative.	Negative.	Negative.
Urea, 0.5 per cent.	0.8 per cent.	2 per cent.
Sugar, negative.	Negative.	Negative.
Chlorides, traces.	0.25 per cent.	1 per cent.
Blood, small amount.	Small amount.	Few cells.
Pus, small amount.	Moderate amount.	None.
Mucus, small amount.	Small amount.	None.
Casts, few hyaline casts.	Few hyaline casts.	None.
Bacteria, many characteristic groups of tubercle bacilli.	Many characteristic groups of tubercle bacilli.	No tubercle bacilli could be found.
Crystalline and amorphous deposits, none.	None.	Rather large amount of oxalate of lime.
Other structures, groups of epithelia, presumably from the renal pelvis.	Numerous bladder-cells and groups, presumably from renal pelvis.	Numerous cells, probably from the ureter.

*Conclusions in Brief.*—Right kidney, tuberculous pyelitis and parenchymatous change; bladder, cystitis probably tuberculous; left kidney, normal. Analysis of bladder urine, December, 1900.—Reaction, acid; specific gravity, 1024; albumen, trace; bile, negative; urea, 2.34 per cent.; sugar, negative; chlorides, 1 per cent.; blood, very small amount; pus, moderate amount; mucus, small amount; casts, very few hyaline casts; bacteria, no tubercle bacilli found; crystalline and amorphous matter, few crystals of uric acid. Other structures: few bladder-cells and few presumably from renal pelvis.

A painstaking and repeated search for tubercle bacilli resulted negatively.

The conclusion of this analysis was that the left kidney was normal and that the right kidney harbored a tuberculous pyelitis, besides some more marked parenchymatous lesion. The patient accepted the proffered nephrectomy, as he said he could not tolerate life as it was. He was sent to the Presbyterian Hospital. Two days' observation showed fifty-eight ounces as the twenty-four-hour quantity of urine. He had a slight afternoon tem-

perature. He was a stocky-built man, and looked robust except in color. Neither kidney was palpable, but pressure over the right caused some pain.

On August 29, 1899, under chloroform anæsthesia, Dr. Brown made outright extraperitoneal nephrectomy. Although the initial incision along the right semilunar line was with the intention of a transperitoneal removal, such persistent abdominal contractions were maintained, under even full anæsthesia, it was seen that difficulty would be met in managing the intestines. Consequently, a long plane of blunt dissection between the parietal peritoneum and transversalis fascia was followed to reach the kidney, then a lateral incision backward at right angles to the first was needed before enucleation and pedicle approach was possible. No space was afforded for getting at the ureter satisfactorily; practically all of this tube had to be left. Drainage was provided for at the posterior angle. All other planes closed in series. Temperature on day following operation was 105° F., receded gradually to 101° on third day, and reached 100° on the seventh. Vomiting was not a feature. In the first twenty-four hours eighteen ounces of urine passed. Average for the first twenty days after operation was fifty-eight ounces. He was discharged at end of six weeks with a fistula at the point of drainage, which persisted for nine months. The abdominal wall is strong, except at the site of a former appendicitis incision. He now lives by peddling in the elevated counties west of the Catskills. He is wholly free from the former right lumbar pain and the distress on urination, but frequency is still annoying.

Pathologist's report: Kidney weight, ten and one-half ounces; surfaces studded with many pearly cyst-like spots. At the junction of the lower and posterior surfaces is a cyst one and one-quarter inches in diameter. The pelvis of the kidney and ureter, intact, were much thickened and showed tuberculosis. (See plate opposite page 230.)

The third patient was a woman, thirty-five years of age, who came under observation in October, 1898. She had tubercular family history, and she herself from the age of sixteen to twenty-three was in poor health. After some years of improved health she began to be annoyed in 1895 with frequent urination, with pain often in the right lumbar region, and at times between the shoulders. For the past six months the lumbar pain had been almost constant. Some days and nights she has had to urinate

every five minutes, and now the calls come every fifteen minutes. During the spring and autumn of 1898 she had chills and fever. After a severe chill six weeks ago, Dr. E. E. Smith found malarial plasmodia in the blood, and also tubercle bacilli in the urine. During the last month she has lost ten pounds in weight. Through the cystoscope the entire trigonum is seen to be markedly congested. The mouth of the right ureter is hyperæmic and œdematous, the left is normal. Upon catheterizing the ureters, seventeen cubic centimetres of milky-hued urine is collected from the right catheter in three minutes, while from the left it took twenty-five minutes to collect six cubic centimetres of normal-looking urine. The analysis of these urines was as follows:

Right Kidney, by Ureter Catheter.	Bladder Specimens.	Left Kidney, by Ureter Catheter.
Reaction, faintly alkaline.	Acid.	Acid.
Specific gravity, 1003.	1013.	1024.
Albumen, 0.5 per cent.	0.25 per cent.	Faint trace.
Bile.	Negative.	
Urea, 0.1 per cent.	1.2 per cent.	2.3 per cent.
Sugar, negative.	Negative.	Negative.
Chlorides, less than $\frac{1}{2}$ per cent.	$\frac{1}{2}$ per cent.	1 per cent.
Blood, small amount.	Small amount.	Small amount.
Pus, considerable and tubular plugs of the same.	Considerable.	None.
Mucus, small amount.	Moderate amount.	None.
Casts, some few granular casts.	Some epithelia and few granular.	None.
Bacteria, many characteristic groups of tubercle bacilli.	Numerous characteristic groups of tubercle bacilli.	No tubercle bacilli found.
Epithelium, numerous groups, presumably from renal pelvis.	Many bladder-cells and groups, presumably from renal pelvis.	Few round cells, probably from ureter.
Crystalline and amorphous deposits, none.	None.	Some uric acid and ureter.
Other structures, none.	None.	None.

If it could be assumed that at the time of ureter catheterization the kidneys excreted urine of the same gravity and chemical character as they did when the "bladder specimen" was excreted, the following conclusions would be justified: A mixture of equal parts of the urines as drawn from the ureters would be equal to the bladder specimen in gravity and amount of urea. If so, the relative excretion of urea in a given time, taken as

indicating excretory ability would be left, 23; right, 1; in other words, excretory work done, right kidney, 4 per cent.; left kidney, 95 per cent. Bladder: evidence of a vesical catarrh, possibly tuberculous cystitis.

The conclusions from this analysis were that the left kidney was normal, the right kidney was the seat of a tuberculous pyelonephritis. The bladder presented some visible catarrh.

The patient was sent to the Presbyterian Hospital and observed for six days, during which the temperature was normal or subnormal, and the daily urinary excretion averaged forty-one ounces.

On December 7, 1898, under ether, Dr. Brown did a right extraperitoneal nephrectomy, removing the gland with seven inches of its ureter, this being severed near the sacral brim. (See plate opposite page 232.) The ureter was greatly enlarged but not hard, the broad mucous surface was studded with tubercles. Undoubtedly the same condition affected the portion left. The kidney had good sized necrotic cavities in four of its pyramids, besides a number of smaller cortical foci. The rather large wound was closed in layers and provision made for two gutta-percha tissue drains.

For four days after operation vomiting was very persistent; lavage gave temporary relief. For the first week urinary excretion averaged twenty-nine ounces per diem, and for ten days the temperature did not exceed  $100\frac{1}{2}^{\circ}$  F. The first dressing was unintentionally postponed until the seventh day. The superficial appearances were perfect. On withdrawing the folded gutta-percha tissue drains some drops of faulty material issued; freer drainage was given at once, but the suppuration process was not controlled until all of the deep and superficial sections were removed. During these two weeks the afternoon temperature reached  $102^{\circ}$ . Healing of the cavity by granulation was slow and closure not complete until April 8, 1899 (121 days). Although a heavy woman, she has no hernia, and requires no abdominal support. Since returning to her country home she has gained constantly in weight and strength, and is now able to do all her household work. She is wholly free from the lumbar distress and difficulty in urination, but urination is still so frequent (every twenty minutes) as to be troublesome.

In many examinations of urine after operation tubercle



bacilli were not found. An analysis made in December, 1900, resulted as follows:

Reaction, acid; specific gravity, 1010; albumen, trace; bile, negative; urea, 1.2 per cent.; sugar, negative; chlorides, 0.5 per cent.; blood, none; pus, very small amount; mucus, small amount; casts, none; bacteria, no tubercle bacilli found; crystalline and amorphous matter, none; other structures, few bladder and many vaginal cells.

These findings give no evidence of a lesion of kidney or renal pelvis. Indication of a moderate chronic cystitis. While specimen shows numerous what are believed to be smegma bacilli, a careful search fails to show tubercle bacilli in the specimens decolorized for twenty-four hours with absolute alcohol.

DR. F. LANGE called attention to the comparatively mild and favorable course pursued by many cases of renal tuberculosis and tuberculosis of the genito-urinary tract generally. In some such cases which have come under his observation, the patients have remained fairly comfortable for seven, eight, and even twelve years. In some instances, where one kidney was diseased to such an extent that its removal was imperative in order to preserve life, and in spite of the presence of tuberculosis in the bladder and even of suspicious symptoms pointing to the opposite kidney, the nephrectomy was followed by apparent recovery in some cases, while in others the progress of the disease was materially checked.

In one case which came under Dr. Lange's observation, the patient had symptoms which pointed to tuberculous infection of one kidney. Subsequently, the opposite kidney became affected to such a degree that it had to be removed. Then, after several years, tuberculosis of the prostate developed. Later, a tuberculous epididymitis which necessitated the removal of one testis. The opposite epididymis also became enlarged, but the swelling gradually subsided until it regained, apparently, its normal condition, excepting that it is still somewhat resistant. This patient, Dr. Lange said, has been under his observation for ten years. He is a druggist, and perfectly able to attend to his duties.

The speaker referred to another patient, a woman, with far advanced tuberculosis of the urinary tract, who has been under his observation for seven years. In her case the disease was so far advanced that several surgeons refused to operate on her.

Both kidneys were apparently involved, and there was extensive tubercular ulceration of the bladder. After removal of the kidney which was most seriously damaged, the woman apparently entirely recovered from the disease, and since then, under hygienic surroundings, she has been very comfortable. Tubercle bacilli have entirely disappeared from her urine.

Based on his experience, Dr. Lange said he was inclined to take rather a hopeful view of some cases of tuberculosis of the genito-urinary tract. Much importance should be attached to the constitutional treatment. The disease varied just as much in dignity and character as tuberculosis in other parts of the body.

DR. WILLY MEYER said that while the use of the cystoscope was lately often deprecated in cases of tuberculosis of the genito-urinary tract, he thought the instrument ought to be employed in order to learn whether the tuberculosis is an ascending or a descending one. He had found and would venture to establish the pathognomonic fact, that in the descending form the mouth of the corresponding ureter is ulcerated, while in the ascending form it is comparatively healthy. In other words, if the mouth of the right ureter, for instance, is found to be ulcerated and the left healthy, we have to deal with a right primary descending renal tuberculosis. If there surely be tuberculosis of the urinary or genito-urinary system, and both ureteral mouths are not affected, but urinary analysis points to renal affection, the case is one of ascending tuberculosis. If in the descending form the kidney which is primarily diseased be removed or in the ascending the same be done with the kidney mostly affected and suppurating, the condition of such patients can be very materially improved, especially if they can afford to go to a warmer climate.

### FRACTURE OF THE PATELLA.

DR. HOWARD LILIENTHAL presented a man, twenty-eight years old, who on the 24th of March, 1896, fractured his right patella by muscular strain. When Dr. Lilienthal saw him, five days later, there was a transverse fracture, with a single small comminution in the lower fragment. The case was treated by massage, as follows: Twice each day the bandage covering the joint was removed, and the parts thoroughly massaged for half an hour. This treatment was continued for six weeks. After the eighth day the patient was allowed to walk about, the joint being

confined by a stiff splint. The patient made a good recovery and was able to resume his occupation as a dancing-master. The union obtained was ligamentous, and there is a certain degree of separation between the fragments, but the functional result is all that could be desired.

A second patient was a married woman, who fractured her patella about five weeks ago, and on the day following the accident gave birth to a child. On this account it was deemed inadvisable to remove her to the hospital, in spite of the fact that her sanitary surroundings were very unfavorable. The fracture was a transverse one, and the massage treatment was carried out as thoroughly as was possible under the circumstances. While the cure is not yet complete, there is some ligamentous union, and since the eighth day the patient has been walking about and attending to her household work.

Dr. Lilienthal said that wiring the patella was attended by some danger, even under the most favorable circumstances. In some instances, of course, there are particular reasons for resorting to it. In a case of fractured patella in a demented woman, who continually tore off her bandages, he was compelled to wire the bone, but, in the usual run of cases, massage gives admirable results. The speaker said it had been asserted that massage really had nothing to do with it; that it was a treatment by means of splints, with early motion. It is a fact, however, that massage of the quadriceps has an important bearing on these cases, as it prevents the muscles from becoming atrophied. This atrophy of the quadriceps has been shown by Raymond, a French pathologist, to depend upon a reflex neuropathy of some sort. He has shown by animal experimentation that there is a trophic relationship between the joint and muscles through the sensory tract.

DR. JOHN F. ERDMANN presented a young man who had been shown about two years ago before the Surgical Section of the New York Academy of Medicine. He had had a fracture of the patella, followed by a refracture, and subsequently by a refracture of the refracture. The original fracture occurred on March 31, 1896, and was treated by massage. About two months later there was a refracture, as the result of a fall. The fragments were then wired, but, as rather a light grade of wire was employed, a second refracture soon occurred. The patient refused to submit to another operation until October, 1896, when he returned to the

hospital with an ankylosed knee and three inches of separation between the fragments. A rather long incision was made over the joint. This showed that the upper fragment of the patella was strongly adherent to the condyles of the femur, and the quadriceps muscle had contracted to such a degree that it was impossible to bring the two fragments into apposition. After making a liberal inverted V-shaped incision through the tendon of the quadriceps, and liberating the attachment of the vastus externus and internus, it was possible to bring the two fragments together. They were then united with very heavy wire, and after sewing up the gap made in the quadriceps tendon the wound was closed and the limb encased in plaster of Paris. Subsequent to the operation the man developed a very peculiar temperature range, for which no satisfactory explanation could be found. His temperature was usually normal during the day and ran up to 103° F. at night. He was discharged from the hospital in four weeks. At present the limb has practically a normal range of motion and firm bony union between the fragments.

### MODIFIED INCISIONS FOR LAPAROTOMY.

DR. L. A. STIMSON, through Dr. Bolton, presented four patients showing the results of a transverse incision after laparotomy. Dr. Stimson said that in his earlier cases he used a slightly curved transverse incision, convexity upward, crossing the median line a little above the area covered by the hair of the pubes. In the later cases the curve was made in the opposite direction, and in two in which more room was needed it was supplemented by a longitudinal incision running from the centre of the first towards the umbilicus. The incision is carried through the sheath of the recti, the latter is freed from the muscles upward and downward, and the abdominal cavity is opened in the median line. This gives sufficient space for most operations upon the tubes and ovaries. If more space is needed it can be obtained by the longitudinal addition mentioned, which is carried through the skin and the linea alba in the upper part of the space between the umbilicus and pubes. By the aid of this supplementary incision he had done in one case a supracervical hysterectomy. The advantage of the incision is in the protection given against the subsequent formation of a ventral hernia, for the recti protect the

overlying transverse cicatrix, and the fascia protects the deep longitudinal cicatrix. It seems to be a valuable extension of the principle of Dr. McBurney's intermuscular operation in appendicitis.

DR. CHARLES L. GIBSON described an incision which for some time past he had used in all abdominal sections in the mid-line below the umbilicus. For want of a better term, he called it an incision in "broken planes." The usual median incision is made down to the aponeurosis covering the rectus muscle. The superficial parts are dissected back on one side, allowing him to incise the sheath (only) in a line parallel to the median line, and from half an inch to possibly two inches to its side, say the left. By blunt dissection the sheath is now lifted up towards the median (to the right), allowing of access to the rectus muscle situated the other side of the median line. The rectus muscle (the right one, if the incision in the sheath was made to the left of the median line) is now entered by blunt dissection a suitable distance from the median line, thus constituting the third plane of incision. The transversalis fascia and (if feasible) the peritoneum are opened as a single layer (fourth plane), not directly below the gap in the rectus muscle, but nearer the middle line. When the wound is closed, the lower planes of incision are covered directly by a layer of tissue which retains its original integrity. Sutures are applied as follows: peritoneum and transversalis fascia, continuous suture of fine chromicized catgut. The gap in the rectus muscle is closed by interrupted sutures of medium-sized chromicized catgut passed so as to encircle only the edges minimizing the amount of tissue necrosis. The aponeurosis is closed with a heavier chromicized catgut suture usually continuous and made with great care to secure a perfect and firm approximation. The superficial sutures are of very fine silk, which cause the least irritation, and if removed early, as they very well can be, leave a scar which in time becomes almost imperceptible,—a circumstance which often secures the patient's gratitude. He did not pretend to offer this procedure as an improvement on existing methods until an experience of some years should confirm his present belief in its advantages. So far no hernial tendency has manifested itself, and he felt better pleased with its possibilities every time he made use of it.

## NEUROPATHIC ANKLE DUE TO LOCOMOTOR ATAXIA.

DR. B. FARQUHAR CURTIS, through Dr. Gibson, presented a man, thirty-eight years old, who began to complain of dizziness and uncertainty in gait about two and one-half years ago, and advanced locomotor ataxia is now present. Two years ago, without sustaining any injury, his left ankle suddenly became much swollen and he lost control of the joint. The swelling was not accompanied by pain. Six months ago there was spontaneous dislocation of the left ankle, and the joint was very painful for several weeks. The pain then subsided.

Dr. Curtis's idea in presenting this case was to elicit suggestions regarding the treatment.

The limb presents an enormous, rather doughy, swelling of the ankle, with inward displacement of the foot. The malleoli are much thickened and the internal malleolus detached. The bones of the tarsus appear altered also. The ligamentous attachments are loose, and the foot cannot support the man's weight without a boot.

DR. GIBSON said the man could probably get along for some time in his present condition. If his life was prolonged, he might possibly be rendered more comfortable by the application of some orthopædic apparatus or splint, with a high shoe on the opposite foot.

COMPOUND DEPRESSED FRACTURE OF THE SKULL,  
WITH LACERATION OF THE DURA AND BRAIN.

DR. GEORGE E. BREWER presented a man, aged thirty years, who was brought to the Roosevelt Hospital the latter part of October last. He stated at that time that, when walking in the neighborhood of a building in the course of construction, he was knocked down by a falling bolt, which struck the skull near the median line, about the junction of the right parietal and frontal bones. He was stunned by the blow, but immediately regained consciousness, and was able to stand until he was brought in the ambulance to the hospital.

On examination, there was a ragged scalp wound extending transversely across the injured region, at the bottom of which could easily be felt a depressed fragment of bone. There was nothing in his pulse, temperature, or general condition to indicate

the presence of shock, severe concussion, or compression of the brain.

He was immediately prepared for operation. Under chloroform anæsthesia, a transverse incision was made over the site of the injury, including all the tissues, down to the bone. The periosteum was retracted. This exposed a circular fracture about one inch in diameter, the detached button of bone being driven entirely below the surrounding bone. The opening in the bone was freely enlarged by means of rongeur forceps, after which the depressed button was easily removed. Quite a free hæmorrhage followed the removal of the bony fragment, and it was seen that it had penetrated the dura and had caused considerable laceration of the brain substance. At the bottom of this wound was found a large amount of hair which had evidently been driven in by the blow of the bolt. The wound was thoroughly cleansed, packed, united, dressings applied, and the patient placed in bed. No reaction followed the operation. The patient's progress towards recovery has been uninterrupted.

### THE POSSIBILITY OF THE TRANSMISSION OF MALIGNANT GROWTHS.

DR. F. LANGE briefly reported the following cases of cancer or malignant tumor in the same family observed by him simultaneously or at approximately the same time. The speaker said, that while no positive conclusions could be drawn from so few cases regarding the possibility of the transmission of the disease from one person to another by contact or by getting it from a common source in the surroundings, food or otherwise, the combined experience of many observers might lead to something definite. We should bear in mind that it is not many years ago since the transmission of tuberculosis was regarded as something not happening. One believed in hereditary influences. Our present views are entirely different and fully supported by the results of clinical observation.

(1) Husband, about fifty-five years of age, cancer of liver. Wife, about forty years of age, cancer of uterus. Wife died several months before the husband.

(2) Husband, about forty-five years of age, cancer of rectum; extirpation; recurrence. Wife, about forty years of age,

cancer of vagina. The wife died before the husband, although her disease was detected somewhat later than husband's.

(3) Wife, about fifty-five years old, cancer of the breast; operation; primary union. Sudden death after return home from embolism of the pulmonary artery. Husband, much older, soon after presented himself with cancer of the rectum; refused operation, and lived for a number of years after.

(4) Old lady; cancer of stomach. Daughter, about forty-five years old, cancer of breast. Survived her mother about one year after being operated, finally dying from metastatic cancer.

(5) Husband, between fifty and sixty years of age, carcinoma of large intestine. First operation entero-enterostomy; about one year later resection of large and small intestine, which he survived fully one and a half years. Died from recurrence of disease. Wife, about forty-five years old, sarcoma of skin of arm; quick growth; extirpation; speedy recurrence. Very extensive extirpation was observed for about one year without recurrence.

(6) Wife, about fifty years old, cancer of breast; operated two years ago. Husband, about sixty years old, died about six months ago from cancer of the liver at Carlsbad, where he was operated for obstinate jaundice.

(7) About ten years ago Dr. Lange treated in the same room a woman, about fifty years old, with cancer of the breast, and her daughter with sarcoma of the breast. Both were operated. The mother died later from recurrent cancer.

(8) About eight years ago he was consulted by a lady from the South, who had an inoperable cancer. He was told that one of her sisters was at home with the same disease and that another had died of it shortly before. Whether all three lived together, he was unable to tell.

(9) The father of the reporter, seventy-seven years old, always healthy, became seriously ill in the autumn and died in May of the year following, as his physician said, from cancer either of the stomach or pancreas. His son, the youngest brother of the speaker, then thirty-nine years old, practising in New York, went home to see him in January, returned about the end of March or April, presented all the symptoms of tumor of the pylorus in June, and died thirteen months after the father's death in spite of repeated successful operative endeavors, from recurrent tumors, which, after the first operation, resection of pylorus, had been declared as benign.



# TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY.

*Stated Meeting, December 5, 1900.*

The President, CHRISTIAN FENGER, M.D., in the Chair.

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## ILEUS.

PAPERS on Ileus were read as follows:

(1) "Ileus due to Vascular Obstruction," by Dr. L. L. McArthur.

(2) "Ileus due to Mechanical Obstruction to the Fæcal Current," by Dr. D. A. K. Steele.

(3) "Ileus caused by Neoplasms," by Dr. A. J. Ochsner.

For these papers, see pages 443 to 465.

DR. CHRISTIAN FENGER agreed with Dr. McArthur that ileus is a term that is frequently vaguely used, like the word rheumatism. He mentioned the classification of ileus as given by V. Bergmann and Kocher. V. Bergmann had divided ileus into occlusions and obturations. Under the head of occlusions he included obstruction by strangulation, Meckel's diverticulum, incarceration, intra-abdominal hernia, invagination, volvulus, torsion of the small or large intestine, of the sigmoid flexure, etc. Under the head of obturations he included occlusions from bowel contents, gall-stones, bands, adhesions, tumors, ulcers, tuberculosis, syphilis, etc. These obstructions are merely mechanical and local, and have no influence on the vessels of the mesentery. Of what practical value is this division? It gives the surgeon an idea about the prognosis, and enables him to determine what line of action to pursue. The most extensive disturbance of circulation is found in cases of embolism and thrombosis; the most dangerous in the mesenteric vessels, and these are consequently of graver prognosis.

In the cases that belong to the first group, in which the blood supply of the mesentery is interfered with, with secondary

destruction of the bowel wall, represented, for instance, by strangulated hernia, the danger to the patient lies in the territory of the bowel involved. In such cases there is a tendency on the part of the bowel to become gangrenous, when a palliative operation is out of the question. Enterostomy has been performed in such cases, but it is a bad compromise. The diseased territory of the bowel should be removed, or the surgeon should not operate at all.

In regard to obturation ileus, a form of obstruction in which the bowel is occluded by its own contents, foreign bodies, gallstones, tumors, a band that catches the bowel transversely, compresses it, and occludes its lumen, where there is no tendency to interfere with the mesenteric blood supply, but the veins of the bowel wall in the dilated portion above the stricture are directly attacked, these cases should be dealt with surgically. In this class the prognosis is the best. The patient can be tided over the intoxication produced by the acute obstruction by doing an enterostomy, which may relieve the distention of the bowel and allow the ulcers of distention to heal, subsequently resorting to more radical operative measures when the proper time arrives. Sometimes it is not necessary to operate subsequently because the obstruction disappears. The more acute the cases of obstruction, the more unfavorable the prognosis. Those that belong to the vascular group of ileus die, as a rule, no matter what course of treatment is pursued.

DR. ARTHUR D. BEVAN made a plea for a more rational classification. When surgeons encountered a case of intestinal obstruction in practice, they needed some scheme of classification which would enable them to make a diagnosis and determine their course of action. For clinical purposes, he divided cases of ileus into dynamic and mechanical. Under the dynamic he included all cases in which the obstruction was due to lack of contraction of the musculature of the bowel. This would include what had been referred to as paralytic ileus in which there was a lesion of the central nervous system. He also included in this class the cases of hysteria which so closely simulate ileus. Dynamic ileus due to lesions of the central nervous system was very rare. He included under the category of dynamic ileus cases of embolism and thrombosis of the inferior mesenteric artery and vein, the so-called vascular ileus which had been described in the paper of Dr. McArthur. The big group of clinical importance under the

dynamic head consisted of the cases due to peritonitis. The mechanical cases of ileus were best divided into two forms, namely, strangulation ileus, and as a type we had exactly the same condition as in the strangulation of an external hernia; second, obturation ileus, and as the best type of this form we had, for instance, the occlusion of the bowel with a large gall-stone, or by a stricture, as a circular carcinoma. He put down four conditions for the purpose of differentiation,—peritonitis, strangulation ileus, obturation ileus, and fæcal impaction. When the surgeon encountered a case of ileus in practice, it should be placed under one of those four headings. Vascular ileus was very uncommon. Ileus due to a lesion of the central nervous system was uncommon. Strangulation ileus was a condition in which, as had been shown by Mikulicz, there is a loop of intestine in the strangulation similar to a loop of intestine in a strangulated hernia.

The division given was important from the stand-point of treatment. Fæcal impaction could be treated without operation in the large majority of cases. Ileus due to peritonitis could likewise be handled without an operation in many cases. Mechanical ileus was to be treated in one of two ways. What could be done with strangulation ileus except to relieve the seat of the strangulation? Nothing. Enterostomy was of no value, because an entire loop was involved, just as in a case of strangulated hernia. In obturation ileus a colostomy or enterostomy might be of great service in saving the life of the patient until more radical measures could be employed or the cause of the ileus had disappeared.

He emphasized the importance of accepting the more modern classification of ileus as mentioned by Dr. Fenger, because it was of absolute value in a clinical way.

DR. JACOB FRANK said the classification given by Dr. Bevan, and which was first mentioned by Mikulicz, was the best he thought that was ever made. He could not understand how Mikulicz placed intussusception under the head of obturation ileus. He referred to one form of intestinal obstruction which would come under the head of obturation ileus in which practically there was no obstruction to be found whatever, and with no kinking of the bowel. Even if the abdomen be opened, nothing could be found in the nature of an obstruction. Mikulicz had spoken of it, and placed it under the dynamic form, it being due to a laming or paralysis of the bowel. While the lumen of

the bowel is patent from beginning to end, the clinical symptoms manifested by the patient are the same as those of ileus. Floating kidney can also produce obstruction of the bowel.

DR. M. L. HARRIS stated that surgeons were able to recognize in obstruction of the bowel two classes of symptoms,—those due to the interruption of the passage of the intestinal contents and those due to sepsis. These two classes of symptoms were best studied experimentally on animals, as they were seldom found clearly illustrated clinically, although occasionally they were seen. In the class of symptoms due to sepsis, there were always changes in the circulation of the gut; while in the other class there may be no changes in the gut circulation. He referred to the article of Riegel on clinical and experimental observations in ileus which first placed the subject clearly in his mind. If a surgeon divides the gut of a dog, closing each end, doing the operation aseptically so as not to produce peritonitis, the dog will live many days, and will show no symptoms except those due to obstruction of the bowel. The animal will die with symptoms of starvation because he will refuse to eat and will vomit. If the abdomen of the animal be opened after death it will be found to be perfectly sterile, as had been proven by making cultures, there being no sepsis or peritonitis. If the gut be obstructed in such a manner that the circulation of some portion of it be interfered with, in addition to symptoms of obstruction there are symptoms due to infection. This he considered the most important point to recognize in all cases of bowel obstruction. Are the symptoms those of obstruction alone, or have we in addition the element of infection? If we have interference with the circulation of the bowel, the bowel is certain to become seriously affected with gangrene or perforation, and such a case requires immediate surgical interference, to deal directly with the part affected. A temporary enterostomy will be of no value because circulatory disturbances are taking place at the point of obstruction, infection is certain to occur, and the patient will die regardless of enterostomy. What brought this forcibly to the speaker's mind was a case which he had about a year and a half ago of a patient who was brought to him from a neighboring State. The patient had had bowel obstruction for several days; still he had travelled a long distance on the train, walked to the hospital, and stood around waiting for Dr. Harris. On opening the abdomen the intestine was

found obstructed by a narrow band scarcely larger than a cord. There was no peritonitis. The only thing that the patient suffered from was that he could not eat, and could not get a bowel movement. Clinically, surgeons should differentiate between the two groups of symptoms,—those due to pure interruption of the fæcal current and those combined with sepsis. In many cases the symptoms were combined, but in those cases in which the symptoms are due to sepsis the surgeon should operate at once, bearing in mind that the circulation of the gut is interfered with, and this should be remedied.

DR. E. WYLLYS ANDREWS stated that he was somewhat sceptical as to any theory of ileus which leaves out of consideration intra-abdominal lesions that can be seen or felt. He referred to the causal relation of functional disturbances of the nerve centres. From a surgical stand-point, very little, if anything, is known about such cases.

He called attention to a point in the treatment of mechanical ileus, namely, the mechanical danger from a large accumulation of fluid material at a point above the seat of obstruction before and after the time such material has been ejected by fæcal vomiting, and particularly during anæsthesia. Patients may be and are drowned by strangulation and from the enormous outpouring of fæcal matter which is vomited when their reflexes are entirely abolished, as the result of a combined impression of the toxæmia of the disease and the toxæmia of the anæsthetic. Last spring, a patient was brought into his service upon whom he was compelled to operate for advanced general peritonitis, associated with perforation of the vermiform appendix. The patient went off the table in good condition after having received stimulants and the usual treatment, and had apparently recovered consciousness and had a good chance to live. An hour later Dr. Andrews walked into the ward by accident and found the patient expiring. The nurses did not recognize the condition. The patient had inspired a sufficient amount of fluid into his own pharynx and larynx to fill the bronchi and trachea full. Theoretically, such an accident might happen after any surgical operation or after the administration of any anæsthetic; but, practically, the danger seems slight except with fæcal vomiting. Efforts were made to resuscitate this patient. He was rolled on his side; a large quantity

of material ran out of his nostrils and mouth, and, when he was inverted, still greater quantities ran out.

Two other fatal cases were narrated in which large quantities of material had been inspired in a similar manner. One was a case in which he operated for intussusception of the ileo-cæcal valve; the other, a patient of Professor Morgan, for intestinal obstruction produced by a band.

DR. WILLIAM E. MORGAN emphasized the remarks of Dr. Andrews in regard to fæcal vomiting occurring during or just after operation. It had been his misfortune to lose four cases from fæcal inspiration, in two of which death occurred several hours after inspiration, while the other two patients died on the table from inspiration of the vomitus. In two of the patients who died, the stomach had not been washed out; in the two others it was washed out. In one case mentioned by Dr. Andrews, the patient vomited fæcal matter during the operation, a small quantity of which was insufflated. As a consequence, the patient became more cyanotic than he was before. He was a large man, had been accustomed to take large quantities of fluid into his stomach, and had therefore largely dilated the organ from excessive eating and drinking. He had not taken any food for four or five days, but had taken large quantities of liquid. He inspired a small quantity of the fæcal vomitus on the table, but had not vomited any matter before the operation. While the obstructing band was being divided, the fæcal matter poured out of his pharynx and nose, so that he inspired some of it. The patient was turned on his side at once, and whatever remained of the fæces was expelled, and the operation completed without any further trouble. The patient was returned to bed; he awoke in due time, with a good pulse; color returned; he conversed with all of his friends, and slept for an hour or more, and without warning he had one enormous fæcal vomit, which he inspired, and died within two or three minutes.

Dr. Morgan cited a similar case, but the inspiration occurred while the patient was on the table. The patient was returned to bed in fairly good condition, but gradually grew worse; his pulse became weaker and weaker; cyanosis increased; heart sounds became weaker and weaker, and he died apparently of some form of toxæmia, not with any of the pulmonary physical signs of œdema or drowning.

He does not think the death of this patient was due to drowning, but to the poisonous elements of the faecal vomit, which affected the heart or central nervous system.

He also cited in detail two other cases.

DR. FENTON B. TURCK directed attention to the frequent occurrence of spastic contraction of the intestines following surgical operations for the relief of intestinal obstruction as the result of handling the intestines or exposing them too freely. He said that Heidenhain had previously called attention to this matter. If the intestines are exposed to air as they lie in the abdominal cavity, or if a current of air is allowed to play upon a certain area of bowel, the bowel will contract to such an extent that one will hardly recognize it as intestine. This has a practical bearing upon surgical operations, because after operations he has been called in to account for the non-movement of the bowels, the spastic contraction causing symptoms of obstruction. He could produce the paralytic form of intestinal obstruction artificially by distention. Toxins forming in the intestines produce œdema, which prevents absorption of the gases, and the gases which result from toxæmic conditions produce paralytic distention, and this in turn results in the formation of ileus.

DR. STEELE, in closing the discussion on his part, gave his reasons for surgical intervention in the class of cases he described. While he had used the term mechanical ileus, he preferred to designate it as acute intestinal obstruction. When a patient presents himself with a sudden onset of symptoms, such as localized pain, colicky in character, constipation, vomiting, abdominal distention, etc., it means the necessity for prompt relief by surgical intervention, which general practitioners, and even some surgeons, do not promptly recognize, nor do they realize the danger of delay. Patients are therefore treated expectantly and palliatively until something radical must be done, or the patient will die, or is dying when surgical relief is sought. Opium should not be given, as it masks the symptoms and obscures the diagnosis.

Purgatives should not be given until it is known that the intestinal canal is permeable. All that should be done is to wash out the stomach, give enemata, watch the case closely, and make an accurate diagnosis, or call competent counsel and, by securing, as far as possible, a history of any antecedent intra-abdominal

inflammation or trauma. This, in the majority of cases, will aid the surgeon in determining the particular form of obstruction.

He thinks the classification mentioned by him is simple, and this he reiterated.

The classification of Mikulicz, mentioned by Dr. Bevan, leaves out of consideration the dynamic or paralytic form of ileus, but it includes a class of cases that are not, strictly speaking, intestinal obstruction. The hysterical and the central nervous forms of ileus are misleading and should not be included under that category.

The division that Dr. Bevan mentioned of two forms of obstruction is good. The rotation of a loop of bowel upon its axis, or a loop of bowel which obstructs or interferes with the vascular supply of a given area of bowel, must be followed by secondary changes in the bowel wall, followed by infection or death if not relieved by a surgical operation. Where there is obstruction by a foreign body, the symptoms are grave and severe. In obstruction from a foreign body, Dr. Bevan said there is increased peristalsis, while in a case of twist of the bowel there is absence of peristalsis. This statement is misleading. There may be absence of peristalsis in the portion of the bowel that is constricted, with vascular changes in the bowel wall, by reason of the obstructed or impeded circulation; but there is increased peristalsis in that portion of the bowel above the point of obstruction. The peristaltic waves can be followed to the point of constriction very readily in a thin person.

DR. OCHSNER, in closing the discussion, called attention to the fact that in practice obstruction *per se* receives the greatest amount of attention. The moment a patient is seen with an intestinal obstruction, the physician directs his attention towards its relief by the use of cathartics or enemata. There is but one form of obstruction which of itself is of importance, namely, that due to fæcal impaction. In other words, whatever is done to relieve obstruction medicinally in cases of volvulus and of intussusception makes the patient worse; whatever is done towards relieving obstruction due to inflammatory conditions makes the patient worse, so that medicinal treatment in cases of obstruction not due to fæcal impaction is not indicated. The only form of treatment that is of any use to the patient is that which relieves the strangulation. He believes that in all forms of obstruction, except



where there is distinct impaction and only impaction, preliminary non-surgical treatment of trying to force a passage through the intestinal canal does a great amount of harm and no good. In every case of intestinal obstruction, whether this be due to inflammatory causes or strangulation or to the presence of a tumor, all nourishment by mouth and cathartics should be at once prohibited, and in case of nausea or vomiting gastric lavage should be employed.

# INDEX TO SURGICAL PROGRESS.

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## ABDOMEN.

**I. Surgery of the Pancreas.** By PROFESSOR CECCHERELLI (Parma). In introducing a discussion on this theme at the last International Congress of Medicine, the author submitted the following propositions:

(1) Surgical operations on the pancreas must take into account the function of the organ.

(2) Emaciation, presence of fat in the stools, sugar in the urine, bronzing of the skin, icterus and pain are the symptoms of most pancreatic affections.

(3) Anatomically complete extirpation of the pancreas is difficult.

(4) Pancreatic surgery has not advanced so rapidly as other departments of visceral surgery because of difficulty in diagnosis and of attacking the pathologic lesion early. At present everything indicates that the tail rather than the head of the pancreas is the field for surgery.

(5) It has been proved experimentally that the pancreas may be entirely removed and the animal live. It has not been proved that this may be done in practice. The morbid process which might call for excision of the organ is usually not limited to it. Extirpation is not rational in tuberculous or syphilitic disease. Partial extirpation is proper as long as the canal of Santorini is left.

(6) The most common tumors of the pancreas are cysts, hæmatic, retention, or hydatid. In these the cysts may be extirpated or incised. In extirpating a cyst the question of opening Wirsung's canal arises and the probable diversion of the pancre-

atic juice into the belly cavity. When a cyst is incised, it is prudent to stitch its walls to the belly wound (marsupialization), or, if this is impossible, to close the sac with great care.

(7) Pancreatic calculi should be extracted.

(8) Necrosis of the pancreas may justify operation to remove dead fragments of the gland.

(9) In suppurative or gangrenous pancreatitis the rule is to abstain from operation during the acute stage. Later operation is useful and may be performed through one of three routes:

(a) Lumbar, extraperitoneal route.

(b) Transpleural route.

(c) Median incision above the umbilicus.

The pus should be evacuated and, if necessary, infiltrated or dead portions of pancreas removed.

(10) Chronic pancreatitis may lead to complications by exerting pressure on the choledochus or pylorus. In such case operation is best directed against the liver or stomach and the obstruction evaded.

(11) In pancreatic herniæ following wounds, reduction and even fixation may be accomplished. The thoracic route is preferable if the hernia is diaphragmatic.

(12) In contusions and wounds, operation may be necessary because of hæmorrhage. Bleeding is stopped by sutures or ligatures and clots are removed.

(13) Floating pancreas is known. Experimental pathology admits of the organ being fixed by suture.

(14) In invagination of the pancreas, operation directed against the complications is permissible.

(15) When the opening between the pancreas and duodenum is occluded, a new route may be made. If this is impossible, a pancreatic fistula may be established.

(16) Pancreatic hæmorrhage may occur without the existence of a wound; it is dependent on disease, most commonly on gangrene. Treatment is the same as in traumatic hæmorrhage.

(17) In cases of annular pancreas, the surgeon has so far abstained from operation; but it might be necessary to divide the ring, or to overcome gastric or intestinal complications.

(18) Sutures placed in the pancreas are tolerated as well as in the kidney or liver.

(19) Wounds of the pancreatic canal may be closed by suture, as in the case of the intestine. Threads should not be left in the canal for fear of calculi forming.

(20) Union of wounds takes place by the proliferation of pre-existing cells, especially of the fibrous-tissue cells.

(21) Pancreatic regeneration has certainly been observed.

(22) After complete excision of the pancreas, one notes great development of the glands of Galeati, and especially an increase of karyokinesis in the epithelium, so that one may suppose, according to Martinotti's experience, that they would suffice to replace the removed organ.

(23) Diversion of the pancreatic juice into the belly cavity does not always induce peritonitis, because absorption is rapid. Like bile, one believes, pancreatic juice is inoffensive when healthy, but the reverse when altered.

(24) In excising the pancreas always ligate before cutting, to prevent hæmorrhage and escape of juice. The cautery is inefficient and dangerous.

MAYO ROBSON (of Leeds) was of the opinion that pancreatic affections are much more common than usually suspected. In his judgment, it is important, in cases of suppuration, to reach the pancreas from behind. To reach the principal pancreatic duct, he incises the second part of the duodenum and opens the end of the duct at the papilla. Chronic pancreatitis may resemble cancer closely, not only symptomatically, but to the naked eye on the post-mortem table.

It is important to distinguish cancer of the head from that of the body or tail. Especially in the young, do *not* too hastily refuse operation because of the belief that the disease is cancer,

since, if the disease happens to be chronic pancreatitis, operation will aid recovery. Ablation of the organ for cancer is rarely possible or proper, except when the disease is limited to the body or tail, and then only if the operation is done early. But the fact remains that some cases, operated on supposedly for cancer, recovered and are now well, is a proof that the disease was chronic pancreatitis. This fact leads Robson to advise operation in all cases not too advanced, especially in the young or vigorous. In cysts Robson advises incision and evacuation.

A parallel exists between the inflammatory diseases of the liver and pancreas. While accepting Fitz's classification of pancreatitis pathologically, yet Robson, for clinical purposes, divides the disease into the acute, subacute, and chronic forms. Etiologically, the cause (both essential and immediate) is bacterial infection; but a number of extrinsic causes may be present, *e.g.*, gastroduodenal catarrh, wounds, lithiasis, etc. Infection almost always enters through the ducts. Robson believes that surgical intervention is as necessary in acute pancreatitis as in any other form, and should be undertaken as soon as the diagnosis is made. If there is much epigastric distention, it is good practice to make an exploratory incision in the left costovertebral angle.

Robson insists on the importance of chronic interstitial pancreatitis, often confounded with cancer and amenable to cure by operation. He believes that this disease is a regular concomitant of stones lodged in the common bile-duct, and that on their removal it often persists.

JULES BOECKEL (Strasburg) said that operations on the pancreas are indicated in traumatisms and inflammation with their sequelæ (suppurative pancreatitis, gangrene, hæmorrhage) in tumors both solid and cystic. Wounds of the pancreas are generally quickly fatal (hæmorrhage and concomitant lesions of other organs). The treatment consists in asepsis and packing. Eight cases out of ten have died. Individual ligation of vessels injured is generally impossible on account of the patient's condition.

In inflammations and tumors the operation is sometimes done on the gland and sometimes in its neighborhood, *e.g.*, a collection of pus may burrow away from the gland and be opened at a distance. When the affection is confined to the gland, operation is difficult and dangerous. The whole organ must not be removed, otherwise a rapidly fatal diabetes would result. Intrapancreatic operations are indicated in cases of tumor and localized pancreatitis. Three routes are available.

(a) The epigastric, when, as is rare, the tumor emerges above the lower curvature of the stomach.

(b) The gastrocolic route, the preferable operation.

(c) The transmesocolic, when the tumor has insinuated itself between the layers of the mesocolon.

Exceptionally, an incision in the flank is proper (tumors in the tail of the pancreas), and the operation becomes extraperitoneal.

FRANCIS VILLAR (Bordeaux) said that early diagnosis of pancreatic tumors is difficult, but becomes somewhat easier as the neoplasm increases. A zone of dulness bounded above by the stomach resonance and below by the colic is the principal physical sign; insufflation of the stomach augments the superior resonant zone and diminishes the dull zone. In some rare cases the tumor passes between the liver and stomach and is not covered by the superior resonant zone. Other symptoms confirm the diagnosis, *e.g.*, diarrhoea, vomiting of fatty material, glycosuria, etc.

The treatment of pancreatic tumors varies as they are solid or cystic. In cysts, the ideal treatment is extirpation; but it is not always practicable, and marsupialization must be adopted. This has given good results. In solid tumors the treatment may be radical or palliative. Experience shows that (1) serious traumas of the pancreas recover readily. (2) Extirpation of the tail and part of the body of the organ is not a very serious operation; a very limited tumor of the head may be removed.

Palliative treatment consists in overcoming biliary retention and intestinal occlusion by means of cholecystotomy, choledochostomy, cholecystenterostomy, etc., and by gastro-enterostomy. Villar has made a pancreatico-intestinal fistula in a case where the gland juice was retained by compression of Wirsung's canal.—*Proceedings of the XIII International Congress of Medicine; Revue de Chirurgie*, September, 1900.

**II. Ectokelostomy.** By DR. JUNIUS VITRAC (France). When operating for strangulated hernia, it is often necessary to drain the peritoneum, but this drainage interferes with the radical cure of the hernia. Such being the case, the surgeon occasionally discards drainage when its use might avert evil. The author has devised a means of drainage which does not interfere with the closure of the hernial opening, and to his procedure, "for the lovers of neologisms," he has given the rather "expensive" name ectokelostomy, which, being interpreted, meaneth displacement and drainage of the sac.

The operation, whether for femoral or inguinal hernia, is performed as follows:

*Step One.*—Expose the sac, open, empty, and separate it from its surroundings, very much as in the Macewen operation.

*Step Two.*—Guided at first by the anterior wall of the sac, pass the finger upward and separate the peritoneum from the anterior belly wall. When the separation of peritoneum has been carried out sufficiently, cut through the belly wall on to the tip of the finger. Pass a forceps through the abdominal wound down to and through the hernial opening. With the forceps seize the distal end of the hernial sac and pull it up so that its end protrudes through the abdominal wound. Sew the sac to the skin with one or two provisional sutures.

*Step Three.*—Close the hernial opening completely. (Radical cure of the hernia.)

*Step Four.*—Through the displaced sac introduce drainage tubes into the peritoneal cavity. Excise all excess of sac.

When there is no further occasion for drainage, close the mouth of the sac with a few stitches and permit it to retract through the abdominal wall, which is now closed.—*Revue de Chirurgie*, January, 1901.

JOHN FAIRBAIRN BINNIE (Kansas City).

## NECK.

**I. Operative Treatment of Spasmodic Torticollis.** PROFESSOR A. WÖLFLE (Prag) reports the case of a woman, fifty-six years of age, who for a period of three years had been the victim of spasmodic torticollis. Pressure at the point of entrance of the spinal accessory of the right side into the sternomastoid muscle caused a temporary cessation of the convulsive movements. Six centimetres of this nerve were removed. While improvement followed the operation, the effect was not curative. Accordingly, one year later a resection was made of the first, second, and third cervical nerves as well as of the obliquus inferior. The result was entirely satisfactory. Freedom from convulsive movements gradually took place, and up to the time of this report, a period of three years, there has been no recurrence.

The idea of resecting the first three cervical nerves first emanated from the English surgeons. Kocher recommended section of the muscle. The author finds in the literature reports of fifteen cases of resection of the cervical nerves with eleven cures and four improvements; twelve cases of section of the muscle with seven cures, three improvements, and two failures; sixty-eight cases of resection of the spinal accessory with only twenty-three complete cures. The author points to the necessity of employing resection of the first three cervical nerves in those cases in which resection of the spinal accessory meets with failure.—*Prager medicinische Wochenschrift*, No. 2, 1900.

RUSSELL S. FOWLER (New York).



## REVIEWS OF BOOKS.

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A TREATISE ON APPENDICITIS. By GEORGE RYERSON FOWLER, M.D. Second Edition, revised and enlarged. Octavo, pp. 236. Philadelphia: J. B. Lippincott Company, 1900.

Of the systematic treatises on appendicitis which recent years have brought to our hands, all useful, valuable, and important contributions to surgical literature, no one has been more timely, scholarly, judicious, and masterful than this work of George Ryerson Fowler. The first edition bore date of June, 1894; the present one of August, 1900. During the period that has intervened between these dates the questions that have most engaged the attention of surgeons in connection with affections of the appendix vermiformis have been those pertaining to their differential diagnosis, to the time when operative interference should be advised, to the importance of the removal of the appendix in all cases, and to the treatment of such complications as diffuse peritonitis. It is in his treatment of these phases of his subject that we find the most notable marks of the careful revision which this book has received. An entire chapter, wholly new, is devoted to Differential Diagnosis between Appendicitis and those affections most frequently confounded with it, whether of the gall-bladder, the kidneys, the intestines, or the uterine appendages. This chapter concludes with an elaborate tabular *résumé* of the symptoms attending each of the conditions likely to be confounded with appendicitis, each table being preceded by a similar *résumé* of the symptoms of the variety of appendicitis for which the particular lesion under discussion has been mistaken. This is the result of a study made by the author of cases that had

been admitted to his hospital service with a diagnosis of appendicitis, but which upon operation or farther examination were found to be affections of another nature.

Dr. Fowler's views as to the time when operative interference should be advised are quite clear and simple. He says: "As soon as the diagnosis of progressive appendicitis is assured, the abdominal cavity should be opened and the appendix removed." "A case demanding operation inside of twenty-four hours from the commencement of the attack is exceptional; but a case which is not practically well at the end of that time should be made the subject of operative interference." "To operate too early may be to operate unnecessarily, but this is always preferable to operating too late, and hence unsuccessfully." "If the surgeon is called in after diffuse septic peritonitis has developed, operative measures should still be instituted."

As to the question whether the appendix should be removed in all cases, and especially in those late cases in which the appendix cannot be removed without breaking down the adhesive barrier which has been thrown out, the author says wisely that in the decision of this question much will depend upon the experience of the operator, and the facilities which he may possess to meet all emergencies as they arise. His later remark that the breaking down of adhesions and the removal of an appendix may be accomplished without undue risk of infecting the general peritoneal cavity indicates his preference for the removal of the appendix as a rule unless strong unmistakable contraindications are present.

In the treatment of peritonitis, what the author calls "the elevated head and trunk" position is advised as an important means of preventing further absorption of septic material from the peritoneal cavity, and of limiting the spread of infection. This is the one addition to the means of combating this dread complication which the present revision presents. From the experience which is accumulating as to the results of this postural

method of limiting the spread of a peritoneal infection beginning in the lower part of the abdomen, there is much reason to attribute marked value to it. The idea is to facilitate by posture the gravitation of infected fluids to the cavity of the pelvis, from which they are to be removed by drains. It is a method which deserves a wide and careful trial.

LEWIS S. PILCHER.

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ANNALS OF SURGERY,

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# THE SURGERY OF THE SPLEEN.<sup>1</sup>

By J. COLLINS WARREN, M.D., (HON.) F.R.C.S.,

OF BOSTON,

PROFESSOR OF SURGERY IN HARVARD UNIVERSITY; SURGEON TO THE MASSACHUSETTS GENERAL HOSPITAL.

OWING probably to the imperfect knowledge of the various affections of the spleen, operations upon that organ have not kept pace with the surgery of the other organs of the abdominal cavity; but the increased attention given to the study of the blood in recent years has aided greatly in unravelling the somewhat tangled classification of diseases of the spleen, has led to a more intelligent study of pathological conditions, and has paved the way for a more rational treatment.

Among the list of affections of this organ,—which is much larger than one might suppose,—there are several which it is generally agreed go beyond the pale of surgery; others have been found to be well adapted to surgical interference, and in some of the more purely medical diseases there are several which hold out hope for encouraging treatment in the future.

It is for this reason that it has seemed to me appropriate in this communication, in presenting a few cases of splenectomy, to call attention to the diseases of this organ, and to consider to what extent, from the present point of view, they are amenable to surgical treatment.

The list, which is by no means a short one, includes, among others, the following:

(1) Malarial Spleen.

(2) Splenic Anæmia.

<sup>1</sup> Read at the ninety-fifth annual meeting of the Medical Society of the State of New York, January 30, 1901.

- (3) Splenic Leukæmia.
- (4) Chronic Enlargement of the Spleen in Infancy.
- (5) Banti's Disease, or Hypertrophy with Cirrhosis of the Liver.
- (6) Atrophic Cirrhosis of the Liver leading to enlarged Spleen.
- (7) Amyloid Disease.
- (8) Echinococcus and other Cysts.
- (9) Cavernous Angioma of the Spleen. Fibroma.
- (10) Wandering Spleen.
- (11) Twisted Pedicle.
- (12) Abscess of the Spleen.
- (13) Rupture of the Spleen.
- (14) Sarcoma of the Spleen.
- (15) Tuberculosis of the Spleen.

There are also groups of cases classed as simple hypertrophy. The enlargement of this organ seems at times to be a racial characteristic. Among the Armenian inhabitants of Boston enlargement of the spleen is so common as to be regarded of little diagnostic significance. In Southern Italy large spleens are said to be very common, and there is a tradition there that disease of this organ is cured by eating onions.

Splenectomy is, of course, no new operation. Indeed, it is said to have been done in the most ancient times, and several writers of antiquity state that the spleen was sometimes actually excised from runners to give them greater speed.

Bartholomeus says that the Turks, if their old chroniclers are to be believed, had a special and secret means of removing the spleen of runners.

According to Shattuck, laymen have informed him that splenectomy has been practised on the Indian runners of Texas and on the Syces of Hindostan, and that this operation was performed on the spleen of the runners to spare them the stitch in the side.

The number of operations performed in modern times is by no means small. Hagen, in a recent monograph, has col-

lected three hundred and sixty, with a mortality of 38.3 per cent. This is a decided improvement on the statistics collected by different writers up to 1894, which varied from 51.6 per cent. to 49.6 per cent. After carefully revising his list and eliminating what would be considered incurable cases, and cases in which the diagnosis has not been sufficiently established, Hagen was able to reduce this mortality to 12.2 per cent., which he thinks may fairly be considered the legitimate mortality of the operation as practised at the present time.

(1) *Malarial Spleen*.—The large spleen of chronic malaria is often accompanied by a degree of anæmia so marked as to justify the term cachexia; the history of the recurring attacks and of residence in malarial districts will assist in the diagnosis, and the blood examination will probably show the characteristic pigment and perhaps malarial organisms. Quite a number of malarial spleens have been removed in recent years, and the mortality per cent. of the operation is still diminishing. Hagen has collected eighty-eight cases of malarial hypertrophy of spleen exclusive of wandering spleen. Of these cases, twenty-four previous to the year 1890 gave a mortality of 62.5 per cent., while sixty-four cases operated after the year 1890 gave a mortality of 23.4 per cent. When we consider the very large size that the organ often attains in this disease, and the unfavorable constitutional condition of the patient, such results, if not all that we could hope for, are at least encouraging. Jonnesco regards the spleen of malaria as a habitat of the malarial organisms, but does not advise splenectomy as an early form of treatment.

(2) *Splenic Anæmia*, or *Splenic Pseudoleukæmia*, is a disease of young adult life, and is to be sharply distinguished from the anæmias of infancy, with many of which is associated a moderate enlargement of the spleen. This is a disease which has lately been brought into prominence by the investigations of several writers; and, as it seems one which holds out promise of good results from surgical treatment, I shall take the liberty of making more than a brief allusion to it.

Sippy collected twenty-five cases of splenic anæmia, and

Osler reported fifteen; these being the only cases so far reported which were in any way characteristic.

The clinical course of the disease is about as follows: An insidious onset, with slight pallor and dizziness, is soon followed by the appearance of the splenic enlargement. There is rarely complaint of much pain and tenderness over the tumor, although extreme sensitiveness may draw attention to the tumor before the anæmia has become marked. At this stage, nausea, vomiting, and diarrhœa may occur as well as epistaxis and dyspnœa. As the tumor increases, enlargement of the spleen towards the umbilicus and the right iliac crest occurs, more complaint is made of the dragging sensation in the left side, and the increased anæmia causes marked debility and fatigue, œdema of the feet, and occasionally an evening rise of temperature. As the disease progresses the extreme pallor changes to a yellowish color, and in several of Osler's cases a bronzing of the skin is noted. Ascites may develop in the later stages, and petechiæ, and even extensive hæmorrhages from the stomach and intestine. Finally, protracted diarrhœa follows, and death from extreme exhaustion. There is no enlargement of the lymphatic glands. The study of the blood in splenic anæmia is essential to a positive diagnosis, many of the reported cases being quite worthless on account of the lack of complete blood examination, and the differential count of the white blood-corpuscles is quite as necessary as an estimate of their whole number, as only by this means can cases of leukæmia, pernicious anæmia, and the infantile anæmias be excluded.

The first change in the blood in splenic anæmia is a diminution of hæmoglobin, together with a lesser degree of diminution of red corpuscles,—an anæmia of the chlorotic type. This is soon followed, however, by an extreme drop both in red corpuscles and hæmoglobin, the appearance of large and small and imperfectly formed red corpuscles, and occasionally even nucleated forms and normoblasts. The coagulability of the blood is much diminished, and the type of an extreme anæmia only little short of the pernicious type is presented. The

white corpuscles are, as a rule, actually and relatively diminished, in spite of the large diminution of red corpuscles, and a differential estimate of the white corpuscles shows probably a normal ratio between young and adult forms. Although a slight preponderance of the younger forms (large and small mononuclears) exists in a certain proportion of cases, there should be no myelocytes. This statement of the blood condition shows that there is no one characteristic which serves to distinguish splenic anæmia from secondary anæmia of any kind; but it is by the lack of certain well defined characteristics that we rule out other and more easily recognized diseases, and for this reason the blood examination is essential. The normal histology of the spleen at the present time is so little understood, and the function of the spleen itself is so obscure, that reports of autopsies and of examination of specimens removed at operations are of necessity unsatisfactory and incomplete.

Sippy collected ten cases where the pathological findings were clearly indicated, and these, for the most part, give us no accurate knowledge of the etiology of the disease.

The spleen is always enlarged, generally to five or ten times its usual size (the normal weight of the spleen is 200 grammes), and there is an increase in the consistency of the organ; on section, areas of connective tissue are described replacing the pulp reticulum with firm tissue. Atrophy and sclerosis of the Malpighian bodies were noted by Banti. (A marked point of differentiation from leukæmia, in which the Malpighian bodies are increased.—Cabot.)

Splenic anæmia is regarded by some writers as a splenic form of Hodgkin's disease. In this instance, however, splenic enlargement is uncommon; and when it does occur, the size of the spleen does not attain the proportions of a true splenic anæmia. The anæmia, also, is slow in its development. Moreover, it does not appear that the condition of the spleen is analogous to the condition of the lymphatic glands in Hodgkin's disease.

Boviard has described a form of endothelial splenomegaly



accompanied by an anæmia of later appearance and longer duration, but it has been questioned whether this might not be actual tumor formation. The weight of evidence, however, lies on the side of Boviard.

The cases described by Osler were of longer duration than Sippy's, one of them extending to ten years. The longest case of Sippy lasted three and one-half years.

Sippy regards the disease as fatal unless relieved by surgical interference. Of the seven cases reported by him in which splenectomy was done, five recovered.

Osler, however, considers the disease of less severity, and advises operation only in chronic cases where there are recurring attacks of hæmorrhage.

A recent writer (A. C. J. Kelly) speaks thus on the treatment of splenic anæmia: "It is upon the assumption that the enlargement of the spleen is the essential feature of the disease that the only successful treatment known at present is based. Medicinal treatment is hopelessly inefficient. In but a few cases has temporary improvement followed regulation of the diet and the mode of living, fresh air and sunshine, iron, arsenic, and the like. In appropriate and selected cases, removal of the enlarged spleen should be considered." He advises operation as soon as the physician can become assured of the correctness of the diagnosis.

In Kelly's case there was hæmorrhage from the genitals, on one occasion, of a quart of blood, the catamenia following at the regular time one week later.

One of Osler's cases, operated upon by Cushing, recovered. Four died, one after an operation for stone in the bladder, and the end result of the other cases is not stated.

The case which I report below adds one to the list of successful cases operated upon for this disease.

(3) *Splenic Leukæmia*.—The clinical features of splenic anæmia and of splenic myelogenous leukæmia are identical. It is for this reason that the separation of this disease has only been attained by the differential blood examination. This shows, in splenic leukæmia, an increase in the total num-

ber of white corpuscles with the appearance of the characteristic cell,—the myelocyte. Even in one case reported by Osler, in which, during the remission of the disease, the white count fell as low as 7500, there was still four per cent. of myelocytes. On the white count, then, and the myelocytes is based the diagnosis of splenic myelogenous leukæmia.

Splenectomy in this disease is almost invariably followed by a fatal result. Hagen reports forty-two operations with only four recoveries. Death was almost without exception due to secondary hæmorrhage from the surface of the wound, owing to the condition of the walls of the large vessels.

The case of Richardson's which I give below adds, however, one to the list of recoveries.

(4) *Chronic Enlargement of the Spleen in Infancy* is, as in adults, an almost constant accompaniment of leukæmia, pseudoleukæmia, cirrhosis of the liver, and malaria. Indeed, most of the chronic affections of infancy, especially those associated with cachexias, cause chronic enlargement of the spleen. The splenic enlargement is, as a rule, moderate only, but it sometimes attains considerable size. The tumor, however, readily yields to the treatment appropriate to the disease, and marked diminution in the size, or actual disappearance, is often recorded.

(5) *Banti's Disease, or Hypertrophy with Cirrhosis of the Liver*.—The case reported by this writer is somewhat analogous to those already alluded to as splenic anæmia.

In the earlier stages we see an anæmia and a progressive enlargement of the spleen followed later, sometimes, after an interval of years, by an interstitial hepatitis; that is, in this affection there is a tendency to cirrhosis; but the liver is rarely involved to any great extent.

Banti's cases show an increase in the marrow of the long bones, and the return to the red or foetal condition. Beyond this there is little positive about the pathological appearances. Extreme anæmia, cachexia, and wasting, together with an occasional bronzing of the skin, and sometimes petechial hæmorrhages in the skin. It seems at least an open question

whether these are not closely related to cases of hypertrophy of the spleen following atrophic cirrhosis of the liver, owing to the close relation of the two organs through the medium of the portal system. Several of Osler's cases, which were marked by extreme hæmorrhage and ascites, call to mind cirrhosis of the liver; and it would seem but fair to state that further proof is necessary to make clear the question of a distinction between these two forms of splenic enlargement, and what relation they bear to the simple idiopathic hypertrophies of the spleen reported in literature.

Hagen reports sixteen cases of Banti's disease in which splenectomy was performed, with only three deaths. In many of these cases, in which the subsequent history was obtained, patients were found to have fully regained their health.

Passing now some of the rarer forms of disease of the spleen, such as *Amyloid Disease*, *Cysts*, and *Cavernous Angioma*, we come to

(10) *Wandering Spleen*.—Enlargement of the spleen is not infrequently accompanied by a displacement of that organ, due to a mechanical elongation of the ligaments by the traction of the organ itself; or it may be due to a congenital laxity of the ligaments themselves. The organ is attached to the diaphragm by the phrenicosplenic or suspensory ligament, and to the fundus of the stomach by a fold of omentum—gastrosplenic ligament—which encloses the splenic vessels as they pass in and out behind the upper border of the pancreas. The organ is less movable at its diaphragmatic attachment, and it is the phrenicosplenic ligament which is the first to feel the traction and become elongated and ruptured. The spleen then falls forward, lies horizontally in the body with the hilus directed upward, and hangs only on the gastrosplenic attachment and vessels, thus drawing the fundus of the stomach outward by the traction of the ligament, and perhaps detaching the pancreas by traction on the vessels. Rotation may then take place and the pancreas be wound round the vessels, which become more or less diminished in calibre, or even obliterated. (Shattuck.) The falling spleen will be a source of danger not only from its displacement (which may cause serious dis-

turbance to the stomach, and even intestinal obstruction), but may give rise, as the result of the twisting of its pedicle, to a fatal peritonitis.

The number of cases operated upon up to the last decade have been comparatively few; but during this decade eleven reported cases, with four deaths, giving a mortality of 36.3 per cent.

On the other hand, of forty-three cases of wandering spleen operated upon during the last decade, there were only three deaths. It would seem, therefore, that, as a prophylactic measure, extirpation of the wandering spleen was a justifiable procedure, and that we should certainly be within the limits of propriety in advising an operation where the displacement had reached a degree to produce marked abdominal symptoms.

Splenopexy does not seem to meet with approval, as the result is uncertain, owing principally to the fact that the displaced organ is usually enlarged and its tissue more or less diseased. The result in Case V seems, however, to have been satisfactory.

(12) *Abscess of the Spleen*.—Only certain forms of abscess of the spleen are suitable for splenectomy. Such cases are those in which the spleen itself is surrounded with pus, or cases in which the spleen, containing an abscess, is not too tightly bound down to the abdominal wall by adhesions. Where there is danger of infecting the general peritoneal cavity by an attempt to extirpate the spleen, it would be better to content one's self by the simple opening of the abscess and drainage.

Seven cases of abscess are collected by Hagen, all of which recovered after splenectomy. In two cases of splenotomy in which the operation was performed, Hagen, the abscess was reached after resection of portions of the ninth and tenth ribs. In the majority of the cases reported, however, the abscess was reached by an incision through the abdominal walls. In one case the abscess followed appendicitis. The same author reports three cases of splenectomy for tuberculosis of the spleen, with two recoveries.

(13) *Rupture of the Spleen*.—The spleen has often been

removed for injury from an open abdominal wound, and more than one-half the cases were successful. When the spleen is ruptured without injury to the abdominal wall, the necessity of an early diagnosis becomes a matter of grave importance. The diagnosis of rupture can be made in the history of a blow received in the splenic region, followed by dulness in this region and the usual symptoms of internal hæmorrhage. The rupture of the spleen, or a subsequent breaking out of a serious hæmorrhage of that organ following injury, is associated with sharp pain in the left hypogastrium and the symptoms of collapse.

Pitts reports three successful cases of splenectomy for rupture. The lesion was caused in one case by a blow from a cricket-ball; in the second by the patient being run over by a hansom cab; and in the third case by a fall across an iron girder. His patients were fed during convalescence on splenic extract and bone marrow, which were supposed to have exerted a favorable influence upon the recovery.

Sevor reports a case of rupture of the spleen in a pregnant woman, splenectomy being performed during pregnancy, which was not affected by the operation.

Pitts advises a median incision below the ensiform cartilage for exploratory purposes, and a subsequent incision in the left linea semilunaris. Both suturing and packing the wound have been recommended as substitutes for splenectomy. Ligature of the splenic artery has also been proposed. These methods are not sufficiently reliable substitutes for the more radical operation.

Since 1890, thirty-four cases of splenectomy for rupture of the spleen have been reported, with a mortality of 41.2 per cent. It is probable that, except in cases of more superficial injury to the spleen, splenectomy is the operation which will be resorted to in the future for this lesion.

(14) *Sarcoma of the Spleen*.—Up to the year 1890, five cases of splenectomy for sarcoma were reported by Hagen, of which three were cured and two died. From 1891 to 1900, four cases were reported, of which three were healed and one

died. To these may be added one death in the short list of cases reported in this paper.

As will be seen from the above review of the subject, the operation of splenectomy has a much wider range than might have been supposed. It is only distinctly contraindicated in such grave organic lesions as leukæmia, cirrhosis of the liver, and amyloid disease. In many other affections its merits still remain to be fully tested. The technical details of the operation are much better understood to-day than when splenectomy was first performed, as is clear from the striking statistics furnished by the very thorough and painstaking work of Hagen. The reduction of the mortality of the operation has been obtained, also, by a judicious selection of cases suitable for the operation. The size of the spleen is much less a contraindication for splenectomy than the adhesions it forms with other organs, death being more likely to occur from hæmorrhage from ruptured adhesions than shock from the removal of the organ itself.

For the removal of the spleen, an incision near the border of the left rectus muscle, or the linea semilunaris, is to be recommended, with such lateral incisions towards the flank or towards the median line as the necessities of the individual case may suggest. The incision should be sufficiently large to enable the operator to inspect with facility the exposed surfaces of the organ and the structures to which it is adherent. All accessible adhesions should first be carefully divided with double ligatures, and the pedicle of the spleen should be exposed, if possible, by lifting up the inner border of the organ. If this is accessible, the vessels may now be secured separately by double ligatures, or the splenic omentum may be transfixed, as Pitts suggests, by a double ligature and each half may be tied separately; the whole pedicle being encircled afterwards by a single ligature. In large tumors, the vessels of the hilus are often enormously dilated, and the walls of the veins are in such cases readily torn. In such cases the greatest possible care should be taken, in the introduction of ligatures, to avoid wounding the vessels.

Before attempting the removal of the organ, the hand should be passed between it and the diaphragm, and its surroundings carefully explored. In some cases the spleen can readily be pulled down by the hand thus introduced, in which case it can be turned completely over, and in this way the vessels of the hilus are immediately made superficial and can readily be seized and controlled. Such was the case in both the operations performed by the writer. The spleen was, as it were, "turned turtle,"—the vessels which before were underneath and inaccessible were now on top. In separating the spleen from the stomach, care should be taken not to injure the walls of the stomach; and if the peritoneum has been freely torn on the surface of this organ, it may be advisable to suture the edges of the peritoneum along the greater curvature of the stomach. Considerable oozing may in this way be effectually controlled. If there have been much laceration of the peritoneum, owing to the severing of the adhesions, the operation field should be tamponed temporarily, and a wick should be left in the wound. In both cases operated upon by the writer, the patient complained of pain in the left side, as if from pleurisy. The diagnosis made in one case at least by Dr. Shattuck, after a careful exploration of the edges, was that this symptom should be ascribed to an "aching void." It is a symptom which is to be expected after so severe an operation in this locality, even under the most favorable circumstances.

*The After Results of Splenectomy* have been the occasion for much investigation, and many varied and quite constant symptoms have been observed in patients who have survived the operation.

On the theory that the spleen was an active agent in the struggle of the body against infections, because of its common enlargement in septic conditions, many experiments on animals have been performed. The conclusions reached by Blumreich and Jacoby by experiments on guinea-pigs show that no difference in resistance to infection of bacteria or of

toxins between guinea-pigs with and without spleens can be determined.

Animals whose spleens have been removed have shown a diminution in the amount of hæmoglobin and in the amount of red corpuscles, and this diminution reaches its height two to three weeks after the operation and disappears after three to four months. (Laudenbach.) These blood changes also occur in man after splenectomy, and repeated observations go to show that the diminution is greater than would be accounted for by the loss of blood at operation. Recuperation after hæmorrhage was observed by Czerny and Maydl to be slower in pigeons after splenectomy.

An increase in the total number of white corpuscles is a practically constant result of removal of the spleen in animals or in man, although in one case reported by Vaquez the white count did not go above 7200. The increase is apparently due both to polynuclear forms and lymphocytes, but data upon this point are unsatisfactory. Tschistowitsch noted an increase in eosinophiles. The white count generally reaches 20,000, but varies within wide limits.

Pyrexia has been observed in several cases (Lacretti, Tschernjackowski), but whether due to absence of spleen or to septic absorption could not be determined. Mental disturbance has also been noted (Bovee), and a change of disposition from a gentle nature to one that was morose and irritable (Deeble), but these results are extremely rare.

A diminution in the biliary coloring matters, and pale color of the fæces, have been noted by Pugliese, and are attributed to the lack of hæmoglobin derivatives which are normally supplied to the liver from the spleen.

Accessory spleens are known to be present in a large number of autopsies (1 to 400 up to 1 to 16 (Hartley)), but they are far from constant, and many observations have been made to determine what tissues or organs vicariously assumed the function of the spleen. Enlargement of the lymph glands has been frequently noticed (Bolton, Warbasse), and the thyroid has three times been found to increase in size after splenec-



tomy. In a few cases, pain in the bones after operation has suggested medullary proliferation (Lacretti), and in animals a reddened and denser condition of the marrow is observed as a frequent result of removal of the spleen.

In general, then, the results of splenectomy are not constant, except for a reduction of hæmoglobin and red corpuscles and an increase of white corpuscles; and these conditions are of only temporary duration, and in no way debar the patient from a complete restoration to health after splenectomy.

The following five cases, hitherto unreported, serve to illustrate fairly well the different phases of surgery of this organ.

CASE I.—*Splenic Anæmia. Splenectomy. Recovery.* Operator, J. Collins Warren. J. M., twenty-six years of age, born in Scotland. He was first seen by me in consultation with Dr. S. W. Torrey, of Beverly, Massachusetts, in September, 1899. The case then presented the following history:

Father had died of tumor of the stomach, and one brother had died of phthisis. He himself had had pleurisy five years before. He had no venereal disease or malaria. His habits had always been good.

About one year before he began to have diarrhœa, the movements taking place from three to five times a day, with tenesmus. He also suffered from distress after eating, which at times obliged him to vomit. Sometimes improved under treatment, but symptoms returned every two or three months since. At times has had regular chills with vomiting. He was never exposed to malaria.

In the previous August he first noticed a lump the size of a grape fruit in the splenic region of the abdomen, that had increased somewhat in size at the time of my consultation. He had lost some flesh, and had for several months been unable to attend to his work. He was not seen by me after this for a year, when I again saw him in consultation with Dr. Torrey. The tumor had increased in size, and now extended across the median line and down to the umbilicus. His other symptoms had not changed except that he had lost considerable flesh, and lately had suffered from dyspnœa on exertion. His general health, however, con-

tinued fairly good. He had been taking arsenic during most of the past year, without any improvement.

The question of operation having been decided, he entered the Massachusetts General Hospital on October 6, 1900. The examination of the patient at that time showed that there were no symptoms of disease in the chest. The abdomen was soft and not distended or tender. A large mass was observed in the splenic region extending from the level of the sixth rib in the axillary line of the umbilicus and inward as far as the median line. It was easily felt by manual palpation, one hand resting on the lumbar region. The tumor was not tender, and moved with respiration. On inflating the colon with air, there was no change in the area of dulness.

*Blood Examination.*—Whites, 2200; reds, 5,200,000; hæmoglobin, 65 per cent.; polymorphonuclear-neutrophiles, 70 per cent.; lymphocytes, 22 per cent.; eosinophiles, 3 per cent.; megaloblasts, .07; normoblasts, .01.

Nothing remarkable about red corpuscles. (F. T. Lord.)

Three days after entrance, the patient, having been comfortable and up and about the ward, was taken at 7 P.M. with a chill. Temperature 101° F., but an examination of the blood showed no plasmodia or pigment.

The operation was performed on October 16. Patient was placed in the reversed Trendelenburg position. Incision was made along the outer border of the left rectus muscle from the costal margin to the left of the umbilicus. On opening the abdomen the spleen was found presenting at the wound. The opening was now enlarged by an incision from midpoint of the first incision to the median line, dividing the rectus muscle; and the hand introduced between the spleen and the abdominal wall was found to follow the dome of the diaphragm on the left, extending to about the level of the sixth rib. Many adhesions were found along the anterior border of the spleen containing large vessels. These adhesions were principally connected with the omentum. Many notches were observed on the anterior border of the spleen. The organ appeared greatly enlarged, and its walls greatly stretched by the vascular condition. The adhesions in sight having been clamped, tied, and cut, the anterior edge of the organ was lifted up, and the vessels of the pedicle were observed greatly enlarged and closely packed together and not easily acces-

sible. An attempt to secure them from this direction having been followed by a brisk hæmorrhage, the vessels were compressed by gauze packing, and the hand being introduced between the spleen and the abdominal wall up to the dome of the diaphragm, the organ was seized and pulled down and drawn out through the wound, the organ being rotated on the hilus as an axis, so that the posterior surface was uppermost. This brought the hilus and large vessels of the pedicle in plain sight. They were easily seized with the left hand, clamped, and tied with silk. The few remaining adhesions being clamped and tied, the spleen was removed.

On inspecting the bed of the tumor, it was found that a considerable amount of the larger curvature of the stomach had been stripped of the peritoneum. This rent in the peritoneum was closed by intestinal sutures. The general oozing from adhesions was controlled by temporary pressure, the abdominal wall was closed by through-and-through silkworm-gut sutures, and a wick was left in for drainage extending to the deeper portions of the wound.

The patient was found to be in good condition at the close of the operation,—pulse 80, and of good quality. In the afternoon and evening he complained of much pain, and was very restless, requiring large doses of morphia. The patient suffered for the first few days from shock; but his condition gradually improved, and the temperature (which did not at any time exceed  $101^{\circ}$ ) gradually fell during the following week to the normal line.

On the 18th, examination of the blood showed: Whites, 24,000; reds, 5,000,000; hæmoglobin, 65 per cent.; polymorphonuclear-neutrophiles, 93 per cent.; large lymphocytes, 3.2 per cent.; small lymphocytes, 3.6 per cent.; eosinophiles, .2 per cent.

On the 19th the whites were 21,400. The wound healed well, although there was some slight redness around a few of the stitch-holes near the point of drainage.

The wick was removed on the third day. The wound healed by first intention.

On October 20, whites, 23,800.

On October 21, whites, 18,000.

On October 24, whites, 18,000.

Stitches were removed on the 25th. Temperature at this time had risen to  $100.8^{\circ}$  F. The patient complained of pain in the left



Cicatrix of incision in Case I



side on taking a long breath. Nothing, however, was found on careful examination. This symptom of pain was present, resembling pleurisy, in both of my operations of splenectomy.

On the 27th, whites, 24,000; reds, 3,256,000; hæmoglobin, 45 per cent.; polymorphonuclear-neutrophiles, 81 per cent.; large lymphocytes, 8.5 per cent.; small lymphocytes, 7.9 per cent.; eosinophiles, 2.6 per cent.; two myelocytes; no megaloblasts; ten mastzellen; no normoblasts.

November 1, whites, 16,400.

November 5, whites, 17,000; reds, 4,496,000; hæmoglobin, 45 per cent.; polymorphonuclear-neutrophiles, 76.8 per cent.; large lymphocytes, 9 per cent.; small lymphocytes, 7.8 per cent.; eosinophiles, 6.2 per cent.; myelocytes, .2 per cent.

There was an evening rise of temperature during the rest of his stay at the hospital, which terminated November 21.

On November 11, whites, 20,000; reds, 3,984,000; hæmoglobin, 40 per cent.; polymorphonuclear-neutrophiles, 82.2 per cent.; large lymphocytes, 7.4 per cent.; small lymphocytes, 9 per cent.; eosinophiles, 1.4 per cent.; no normoblasts or megaloblasts.

On November 18 there was a slight pain in the left ankle, foot was œdematous, and marked tenderness in the calf of the leg over the saphenous vein. Kept in bed and leg tied up on pillow splints. This tenderness and swelling eventually disappeared.

On the 21st, the day of his return home, the blood examination was as follows: Whites, 15,000; reds, 4,000,000; hæmoglobin, 40 per cent.; polymorphonuclear-neutrophiles, 82.8 per cent.; large lymphocytes, 7.4 per cent.; small lymphocytes, 5.8 per cent.; eosinophiles, 4 per cent.; red shows a slight poikilocytosis.

For a week or two previous to his departure from the hospital the patient was moved in a chair into the open air, but, owing to the continued pyrexia, failed to regain his strength. This pyrexia continued for a week or two after his return home. Under careful nursing and plenty of fresh air, it presently disappeared, since which time the patient has fully regained his health and strength and weight, and now (March 18) feels as well as he ever did in his life.

Examination of the blood, December 10. Whites, 21,600; reds, 4,672,000; hæmoglobin, 52½ per cent.; polymorpho-

nuclear-neutrophiles,  $73\frac{2}{5}$  per cent.; large lymphocytes,  $8\frac{4}{5}$  per cent.; small lymphocytes,  $15\frac{4}{5}$  per cent.; eosinophiles, 2 per cent.; two myelocytes; no nucleated reds; reds not remarkable.

Examination of the blood, January 23, 1901. White corpuscles, 16,000; differential count, 500 cells; polynuclears,  $79\frac{4}{5}$  per cent.; large lymphocytes,  $10\frac{1}{5}$  per cent.; small lymphocytes,  $5\frac{3}{5}$  per cent.; eosinophiles, 3.5 per cent.

Nothing abnormal noted in size or character of the reds.—(L. G. Mead.)

The following pathological report is made by Dr. W. F. Whitney:

The spleen removed by Dr. Warren, October 16, 1900, was greatly enlarged, weighing 1155 grammes and measuring twenty-one by sixteen by eight centimetres. The outline was normal, with the exception of deep indentations along the anterior edge, giving it, at first sight, a somewhat lobulated aspect. The capsule was smooth, and from the outside presented the normal color. The vessels at the hilus presented nothing remarkable. The section surface was of a uniform red color, the follicles were indistinct, and the trabeculæ prominent.

*Microscopic Examination.*—Portions of the spleen were hardened immediately upon removal in Zenker's fluid, and stained in various ways. On section the vascular openings were well marked, follicles small and infrequent and rather irregular in outline. The embryonic centres were marked by large cells, with an occasional one showing nuclear figures. The spleen pulp was characterized by the thickness of the reticulum, the smallness of its mesh-work, and by the relatively small number of cells in the spaces. Nowhere were there any phagocytic cells to be seen. The spaces contained a moderate number of red corpuscles. Occasional eosinophiles were found, but were very moderate in number.

The enlargement of the spleen seems to be entirely in the growth of the pulp, with hypertrophy of the reticulum.

CASE II.—*Sarcoma of the Spleen. Splenectomy. Death.* Operator, J. Collins Warren. C. M. P., thirty-six years of age, entered the Massachusetts General Hospital on December 21, 1899, service of Dr. Shattuck.

He had had the ordinary diseases of childhood, and had suffered ten years before from severe malaria while in India as an English soldier. His health since, however, has been good. For two months past has noticed an increasing lump in the left side, at times painful. Has lost fifteen pounds the last four months. Has had no other symptoms.

Physical examination shows a well developed man of rather pale complexion. There is an irregular prominence in the left hypogastrium extending a little to the right of the median line, firm, not tender, moving a little with respiration, somewhat movable on palpation. Dulness encroaches on the left pulmonary space to the eighth rib on the axillary line.

Blood count shows: White corpuscles, 5000; hæmoglobin, 60 per cent.

There was the slightest possible trace of albumen in the urine, and a few hyaline casts. As the growth of the tumor appeared to progress, it was decided to attempt its removal by an operation. This was done on January 11, 1900.

An oblique incision was made parallel to the axillary border. A smooth, dark purplish tumor presented, very adherent on all sides. An exploratory incision into the tumor showed it to be a sarcoma covered with a thin capsule of spleen tissue. The incision in the abdominal wall was now enlarged downward along the outer border of the left rectus muscle. The tumor was seized, as in the former case, in the right hand, passed behind the spleen and the diaphragmatic wall, and pulled downward. The extensive adhesions were divided by the actual cautery; some of the tissue of the pancreas being removed with the tumor. A portion of the spleen, not affected by the growth, was allowed to remain attached to the cardiac end of the stomach; the free hæmorrhage from the adhesions not permitting a prolonged dissection. This hæmorrhage necessitated an extensive packing with gauze which protruded from the upper portion of the wound, which was brought together by through-and-through stitches. The gauze was removed on the third day; and it was found on the fifth day that there was an extensive bloody, serous oozing from the wound, an examination of which showed an infection with streptococci. The patient rapidly failed and died on the following day. Autopsy by Dr. Wright showed an acute general peritonitis, pleuritis, and streptococcus septicæmia.



A portion of the spleen was found measuring twelve by twelve by three centimetres, apparently normal on section. No sarcomatous tissue found.

*The Pathological Report of Dr. W. F. Whitney.*—Two specimens of the tumor were submitted.

(1) Small, round-celled sarcoma, size of two fists, partially covered with tissue resembling the spleen.

(2) Sarcomatous mass, size of palm of hand, with some pancreatic tissue, and a small supernumerary spleen, size of a walnut.

CASE III.—*Splenic Leukæmia. Splenectomy. Recovery.* Operator, M. H. Richardson. Mrs. E. M. D., of Haverhill, a woman of thirty-four, with five children, good family history, had her last menstruation in August, 1900. For two months there had been no flow. She thought herself pregnant. She came of a strong and healthy family. There had been no abnormalities of menstruation up to August. Her husband noticed in February, 1900, a bunch in the left side of the abdomen. She had had a backache. Since May, 1900, she had complained of spells of weakness and of a pain in the left lower extremity. Her family said that she looked very weak. Her friends had remarked on her bad looks. There had been no malaise and no localizing symptoms. Her appetite had been poor. Her father and mother living and well. In the family there was no tumor, consumption, or cancer. I found the woman lying in bed. She was nervous, frightened, and crying. I did not notice anything wrong in her general appearance. She seemed to be in good general condition; good color to her lips. I found a hard, doughy tumor filling the left side of the abdomen, extending from the ribs on the left side to the pelvis. The right border of this tumor had a sharp edge and had a distinct hilus in it. The line of the tumor extended diagonally, downward, forward, and to the right, from the rib margin near the epigastrium on the left. The diagnosis was "enlarged spleen."

I decided to examine her under ether, to be sure. Under ether, the tumor was found to be very movable, and unmistakably the spleen. It could be tilted up so that the right edge looked forward.

The patient was so nervous and frightened that I decided that it was best to go ahead rather than let her come out for

renewed study. The operation promised to be easy and seemed to be the only chance of permanent success. It was therefore decided to operate.

A long median cut was made from the edge of the epigastrium to below the navel, large enough to deliver the tumor, if necessary. The intestines were all packed to the patient's right and the splenic vessels put on stretch. I began at the lower part and tied each vessel with two ligatures about an inch apart, and the vessels were then cut between the ligatures. Excessive care was taken in applying the ligatures not to tear the veins. The tumor was, as we had supposed, the spleen. It was dark-colored and soft. It was extremely movable, and it was clearly one of the easiest of operations to remove it. The vessels, in spite of great care, were easily torn in the manipulations; but there was practically no hæmorrhage; probably in the whole operation not a teaspoonful of blood was lost. The tail of the pancreas was intimately connected with the splenic vessels and required several ligatures; also the attachments of the stomach. We went ahead leisurely and thoroughly and got out the spleen finally without shock. The time was about forty-five minutes. Silk ligatures were used; silkworm-gut sutures through the abdominal wound. There were no buried sutures enclosed in the abdominal wound. At the close of the operation the pulse was 92. The spleen was filled with a reddish-brown muddy substance, and was evidently changed blood. One small gland was removed from the pedicle of the spleen.

The patient did very well after the operation, except that the pulse went up. There was some pain in the lung, which was supposed to be a localized patch of pneumonia. She made an excellent recovery; at the end of three weeks she was able to be up and about. There has been a considerable improvement in the character of the blood.

*Report of Pathological Examination by Dr. W. F. Whitney.*  
—The spleen removed by Dr. M. H. Richardson, December 12, 1900, was received within three hours of the time of its removal and while yet warm. It was very much enlarged, weighing 2275 grammes, and measured twenty-five centimetres in length by sixteen in width and nine in thickness. Its shape and form were, in general, regular, but on one part of the surface there was a slight depressed area measuring four centimetres in greatest extent,

and of a deep yellow color. This was evidently the result of an anæmic necrosis. Otherwise, the spleen presented no remarkable appearance externally. The capsule was smooth and of normal color. It was of moderate firmness.

On section, it was uniform in texture and of a pale grayish-red color. The openings of the vessels were visible, the follicles not to be made out with the eye, and the trabeculæ only here and there to be seen. At the hilus was a large vein filled with a loose grayish-red thrombus. The blood which came from the vessels was of a pinkish-red color and formed rather loose coagula. Lying at the hilus, attached to the spleen, was a small lymph node the size of a bean, and another a little larger had been removed separately.

*Microscopic Examination.*—The spleen was hardened in Zenker's fluid and stained in various ways. With a low power the follicles were seen as occasionally widely separated accumulations of lymphoid cells which stained deeply. Between them the spleen pulp was very much increased, the openings of the veins were prominent and could be readily detected. On examination with a high power numbers of large mononucleated cells were found lying in the meshes of the reticulum associated with eosinophiles in large numbers. The reticulum was not increased in thickness, but the spaces seemed to be dilated, and in this way the increase in bulk was brought about.

The examination of the lymph nodes showed the lymph channels filled with large mononuclear cells, among which were occasional eosinophiles. The medullary strings were replaced by similar tissue, but less compact, and in which were very numerous eosinophiles and large multinucleated protoplasmic masses (giant cells). There was only a narrow zone of lymphoid tissue to be found in the periphery. The infiltration in the gland had apparently taken place from the hilus outward.

*Microscopic Examination* of the blood, taken at the time of the operation, showed the characteristics of an advanced leukaemia, viz., myelocytes, largely increased number of the eosinophiles, and the presence of macrocytes and microcytes, together with numerous megaloblasts and normoblasts. The absence of lymphoid cells was noticeable. Examinations of the blood, made at short intervals until a month after the removal, showed essentially the same features without any material change, except in

the last examination, January 10, there appeared to be fewer myelocytes in proportion to the polynuclear leucocytes. There was no increase in the lymph elements.

From a histological stand-point, the two spleens, one from the case of anæmia and the other from leukæmia, are extremely interesting. In both the follicles are reduced in size. On the other hand, in the spleen of anæmia the reticulum seems to be increased and the size of the meshes decreased. In the spleen from leukæmia, the increase appears to be due chiefly to distention of the meshes of the reticulum, which is of normal thickness.

In regard to the lymph nodes in Dr. Richardson's case, the lymphoid elements are entirely replaced by those of the bone marrow. If this is an index of what has taken place in other parts of the body, it is not surprising that the lymphoid elements should be absent from the blood, and that there should be no increase of them after the removal of the spleen.

In Dr. Warren's case, we have no definite information in regard to whether any change has taken place in the structure of the lymph nodes. It is extremely interesting that, although the blood shows a marked leucocytosis after the removal of the spleen, it is not due to an increase of lymphoid cells, as has been found to have taken place usually in cases of normal splenectomy.

It is a question whether the removal of the spleen in these two cases will have any effect upon the progress of the disease, as the consensus of opinion is that the spleen has really nothing to do with the formation of the blood after birth, its function being chiefly to remove the worn-out and used-up corpuscles and their detritus. In Dr. Warren's case, it is possible that this function of the spleen may have been too active, although no evidence of any such phagocytic action was detected in its cells. In Dr. Richardson's case, the overloaded spleen may be looked on as an overcharged filter which simply was pouring out cells, which it could no longer retain, into the circulation. As regards its phagocytic action, there was no evidence of it, if it still possessed it. Therefore, on purely theoretical grounds, the removal of the spleen would do no harm in either case, and may tend to lengthen life by the removal of a heavy burden from the abdominal cavity.

CASE IV.—*Rupture of an Infarcted Spleen. Splenectomy. Death. Autopsy.* Operator, F. B. Lund. P. R., male, aged twenty-six years, single, was brought to the Boston City Hospital, on July

12, suffering from severe pain in the epigastrium and left side of the abdomen. He had suffered for several months from pain in the abdomen, less severe, however, than the present attack. The pain had suddenly become very severe on the day of his entrance to the hospital, while he was lifting a moderately heavy basket. He was admitted in the evening, and was in such great pain that it was not possible to obtain from him more than the most unsatisfactory history of his illness. He required frequent doses of morphia to quiet him during the night, and in the morning was seen by Dr. Lund in consultation with Dr. J. W. Bartol, to whose service he had been admitted.

Examination showed a rather thin young man, with anxious expression, blanched lips, skin pale and moist. He was restless, constantly groaning, and complaining of thirst. The tongue was dry and slightly coated. On both legs were old ulcers, surrounded by pigmented areas of skin. The saphenous veins of both legs were enlarged, and along the whole length of the outer border of the right rectus abdominis muscle extended an enlarged superficial vein. The abdomen was moderately distended. There was acute tenderness in the epigastrium, especially a little to the left of the median line, shading off towards the lower portion of the abdomen, and spasm of the abdominal muscles on pressure, most marked in the epigastrium. The presence of free fluid in the abdomen was evidenced by dulness in both flanks in the recumbent position, changing to tympany when the patient lay on the opposite side. Percussion showed increased area of splenic dulness, though the exact outlines were not marked out. The temperature was 101° F. and the pulse 124, weak and compressible. The patient had vomited greenish fluid several times during the night. A diagnosis was made of acute peritonitis originating in the epigastrium, probably perforating gastric ulcer. The patient was etherized, and on making an incision above the umbilicus in the median line, several dilated subperitoneal veins were noted. On opening the abdomen, there was an immediate escape, not of the expected pus or turbid serum, but of a large quantity of dark fluid blood. After rapidly sponging and washing out a great deal of blood, estimated at least at two quarts, from the abdomen, and enlarging the wound upward and downward, the wound was forcibly retracted to the left, the side from which the most blood seemed to come, and a longitudinal rent about three inches long

was found in the capsule of the greatly enlarged spleen, with a smaller rent above it on the external surface. It was thought that attempts to suture the torn capsule, through which pulpy splenic tissue was protruding, would prove futile; and the spleen, which was adherent to the diaphragm by fresh fibrinous adhesions, was brought outside the abdomen and removed, after ligature of the pedicle, consisting of the splenic artery and vein, with a transfixion interlocking double ligature of coarse silk. On section of the vein it was found to be filled with a thrombus, and the hard clot could be felt extending along the vein above the ligature for some distance. The fatty and connective tissue through which this ligature was applied was somewhat frail, so that the first ligature cut through, and a second had to be applied above it. Thorough irrigation of the abdomen resulted in the washing out of much blood from the pelvis and both flanks. The abdomen was left full of salt solution, and sutured with through-and-through sutures of silkworm gut. The patient bore the operation well, and the after-treatment consisted of the liberal administration of salt solution and stimulants under the skin and by the rectum. The patient had a fairly good night, though rather restless, and on the following day became more restless and began to vomit. The blood count showed 25,400 white corpuscles. The third day the vomiting had ceased, and he was taking considerable fluid by mouth, and the bowels moved freely. The pulse through this day was 130, weak and irregular. During the evening the pulse failed, and death occurred at 3.45 P.M. on the fourth day.

The autopsy by Dr. F. B. Mallory showed a slight roughing of the surface of the coils of jejunum immediately under the wound, no more than would normally result from the manipulations of the operation and suture. There was no blood or other fluid in the general peritoneal cavity, more than the normal amount of serum. The portal vein contained a thrombus which almost completely filled it, and extended along the splenic vein to the front, where it was ligatured. A small vein on the greater curvature of the stomach was also thrombosed. The cavity left by the removal of the spleen was walled off by light adhesions, and contained a little serum and blood at the bottom. Other organs normal. Anatomical diagnosis; traumatic peritonitis; thrombus of portal, splenic, and gastric veins; splenectomy.

The pathological report of the spleen, signed by Dr. F. B.

Mallory, stated that the specimen was an infarcted spleen, with rupture of the capsule, and that microscopic examination showed no evidence of malaria, tuberculosis, or other disease.

It would seem as if the capsule of a spleen, swollen by infarction resulting from thrombosis of the splenic vein, had been ruptured by the slight violence caused by the exertion of lifting a basket. A plausible explanation of the thrombosis and infarction might be found in a twist of the pedicle of a movable spleen. At the operation, however, no twist was found, and the spleen was lightly adherent to the diaphragm in its normal position.

The so-called spontaneous rupture of the spleen is rare, but not infrequent in tropical climates, where the greatly hypertrophied spleens met with in malarial regions are not infrequently ruptured by even slight blows upon the chest, resulting in fatal hæmorrhage.

In general, rupture of the spleen is due to very violent accidents, such as falls from heights, railroad crushes, etc.

In the case in question, it would seem highly probable that distention of the capsule nearly to the bursting point by the cutting off of the egress of the blood by thrombosis of the splenic vein had prepared the way for rupture of the capsule by slight violence. The great enlargement and total infarction of the organ, together with the presence of the rupture and absence of other disease, render this conclusion almost inevitable.

The operation of splenectomy, which in this case was a rapid and easy procedure, arrested the hæmorrhage, but did not remove the cause both of the rupture of the spleen and the death of the patient, namely, thrombosis of the portal vein.

CASE V.—*Splenopexy*. Operator, F. G. Balch, M.D. Mrs. L. E. D., forty-six years old, married. Mrs. D. entered my service at the Carney Hospital, November 21, 1901. Her family history is negative, as far as can be determined, in regard to her present illness. She says her mother died of a "tumor of the bowels" and her father of a fever. As a child she had scarlet fever, and has been very deaf ever since. Her doctor, Dr. Wallace E. Webber, of Lewiston, Maine, sent in a full history of the case, which is followed closely in this record. She is a well-nourished woman and has had two children. Twenty-eight years ago she was crossing the street, when she fell, striking her left side violently against the edge of a stone. For two years after that she

was a great sufferer with pain in that side, a sinking sensation "in the stomach," and dizziness. She gradually recovered, although never regaining her health completely. Seven years ago she was caught on the front of a car and received a severe shaking. She was taken to the hospital in Chelsea, and a tumor was then discovered in the left side. This the doctors told her could be easily removed. She had a badly lacerated perineum, and chose that time to have it repaired, but, as the tumor then gave her very little inconvenience, she refused to have it operated upon. Dr. Webber had been the family physician for two years previous to August, 1900, and, although he knew that she was not well, he had never been called to attend her. August 1 she went to Boston for a visit, and the first day there she was seized with severe pain in the right side and vomited. She was constipated, and said she had had a good deal of pain in the bowels all summer. The diagnosis made was appendicitis, but, as she improved rapidly, she was sent home in about ten days without operation. She had been up only a few days, and as soon as she got home she went to bed and sent for her doctor. He found her suffering severely with a great deal of pain in the right side of the abdomen. She had no fever and a good pulse. She was constipated. There was a decided tumor, more marked upon the left side than on the right. Upon vaginal examination this mass appeared to be connected with the ovary, though it might have been a pedunculated fibroid. There was marked tenderness over the appendix. The pain was intense, and nothing but morphine gave her any relief. As the symptoms were not urgent, she was kept on a light diet with salts and counter-irritation for a week. As she was no better at the end of that time, a consultation was held and operation urged. She went to the hospital about the middle of August and was operated upon. An incision was made in the median line and the tumor exposed. It proved to be the spleen, somewhat enlarged, resting upon the pelvic brim and firmly fixed in its new position by adhesions. Its removal was considered too dangerous to undertake without the consent of the patient's relatives. The appendix was found to be diseased and was removed. She made an uneventful recovery from the operation, but continued to have the same pain. She had had a prolapse of the uterus for some years, and had to wear a cotton plug in the vagina to hold it in place. Examination, November 22, showed the uterus tipped



back with a good-sized tumor in front of it, but apparently not connected with it. The tumor was somewhat movable though slightly adherent to the scar. The kidneys could not be palpated. There was no splenic dulness. The heart and lungs were negative and the urine normal. Examination of the blood showed that to be normal. I operated November 30. The abdomen was opened in the median line just to the left of the old scar. There was some encysted fluid in the peritoneal cavity just below the incision. The spleen came into view at once. It was adherent in one place for about two inches by firm adhesions along the line of the old scar. The splenic vessels were found coming off from the under surface in their normal position and seemed to be of normal size. On the lower anterior edge were several large vessels in old and very firm adhesions. The connection below was to the anterior abdominal wall just above the bladder. These adhesions were divided part at a time until the spleen was entirely free except for its normal vessels and could be lifted outside the abdomen. There was some troublesome hæmorrhage from the splenic end of the adhesions, where some large veins were torn during the separation. Stitches put through the spleen to control the hæmorrhage only increased the bleeding, and the actual cautery had to be freely used to stop it. The size of the spleen was noticeably increased while it was outside the abdomen, but when it was replaced as nearly as possible in its normal position the congestion was relieved and it became nearly normal in size. As the organ was not diseased, unless a moderate amount of hyperplasia could be called disease, it was decided not to remove it, but to put it as nearly as possible in normal position and try to keep it there. As the separation of so many adhesions had given a large torn surface on the spleen, and as every attempt at stitching gave troublesome hæmorrhage, no attempt was made to suture it into position, but it was packed in place with gauze. It was expected that the gauze would cause further adhesions along the lower edge, and these would aid in holding it in position. The incision was closed except where this gauze came out. In applying the dressing, a pad was so placed as to further push the spleen up and keep the abdominal wall firmly against it. It was found impossible to get the spleen as high as its normal position, but it was put in as nearly normal position as possible. There was a great deal of shock during the operation, especially while the spleen was being

handled. The pulse went to 140 early in the operation, and at one time was 180. Three one-twenty-fifth grain injections of strychnia were given besides a stimulating enema. At the end of the operation the patient was in fair condition, and next day the pulse had dropped to 80; the temperature next day was 99. When the patient was put to bed, the foot of the bed had been elevated eighteen inches. At the end of three days it was lowered six inches, and kept at that height until the twentieth day, when it was lowered to its normal position. This was done, not on account of the shock, but to take all drag off from the newly forming adhesions. There was some discomfort during the first few days from distention, but enemata relieved that. On the third day the gauze packing was removed and a provisional suture tied. Dull pain in the pelvis, where adhesions were torn and high up in the new position of the spleen, though marked at first, gradually disappeared, and by the end of ten days there was no pain at all. The patient was in bed flat on her back three weeks. A supporter was then adjusted, giving firm pressure over the lower abdomen, and having a pad to give extra support to the lower border of the spleen. She gradually gained strength and went home, January 1.

January 28, 1901. Mrs. D. came to my office to-day, riding about four miles on electric cars and walking about half a mile. She says that when she gets very tired she has a slight dragging sensation in the splenic region, but none of her old pain. The spleen is plainly felt in about the same position as when she left the hospital. The lower border is on a line drawn from the anterior superior spine of the ileum to the umbilicus. The upper edge is two inches below the rib margin. The outer edge is lost in the kidney dulness.

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CONCERNING PROMPT SURGICAL INTERVENTION FOR INTESTINAL PERFORATION IN TYPHOID FEVER, WITH THE RELATION OF A CASE.

By HARVEY CUSHING, M.D.,

OF BALTIMORE,

ASSOCIATE IN SURGERY, THE JOHNS HOPKINS UNIVERSITY.

*(From the Surgical Clinic of Professor Halsted.)*

ONLY ten years ago Professor Eulenburg<sup>1</sup> wrote in an article on "Abdominal-typhus" relative to the question of operative intervention in cases of intestinal perforation, "Die Operation ist in diesen Fällen fast durchweg gut und schnell geglückt; man hat nach der Laparotomie das Loch gefunden und schliessen können; trotzdem sind alle Patienten rasch zu Grunde gegangen, und wir haben uns die Frage vorgelegt, ob überhaupt ein Typhuskranker im Stande sei, den Eingriff einer Laparotomie, nachdem eine Perforation erfolgt, zu vertragen."<sup>2</sup> At the time of this expression of uncertainty, only one authentic case, that of Wagner, was known to have recovered after laparotomy, and up to the present day a corresponding sentiment prevails, chiefly in France and Germany, among physicians, who are naturally reluctant to surrender

<sup>1</sup> Encyclopädische Jahrbücher der Gesammten Heilkunde; herausgegeben von Professor A. Eulenburg. Erster Jahrgang, 1891, S. 14.

<sup>2</sup> Three years later, in 1894 (Ibid., Band iv, S. 8), appears the following note. "Von 3 Fällen von Darmperforation vermochte Van Hook einen durch die Laparotomie (*trotz derselben?* vergl. unseren ersten Nachtrag) zu retten. Die bislang mitgetheilten Resultate—auf 12 Fälle eine Heilung—hält es nicht für entmuthigend." A similar scepticism concerning the propriety of operative procedures in cases of perforation appears to the present day in the volumes of the Jahrbücher.

with any degree of promptitude these cases to surgical measures which have seemed to be little more than the occasion of a hurried exitus. Since the papers published in 1897 by Monod and Vanwerts<sup>1</sup> in France and by Geselevich and Vanakh<sup>2</sup> in Russia, practically no contributions have been made to the subject in continental literature, and at that time the cases which had been reported were few and the results far from encouraging.

In marked contrast is the feeling which prevails to-day in America, where, according to the statistical tables, more than two-thirds of all the recorded operations seem to have been performed, and the rapid accumulation with each year in the number of reported cases gives evidence of the increasing degree of confidence with which physicians, in this country at least, have come to regard operative intervention in this serious complication.

It is a natural sequence that there should have been a corresponding diminution in the mortality rate due to a greater familiarity with the surgical problems offered. In 1898, Dr. Westcott, for that book<sup>3</sup> which has done so much to stimulate interest in the surgical aspects of the complications of typhoid fever, collected eighty-three cases, covering a period of more than ten years, which gave a recovery rate of 19.3 per cent. By the end of the following year alone Dr. Keen<sup>4</sup> had cognizance of seventy-five additional cases, showing a considerable improvement in the percentage of recoveries (28 per cent.), and there seems to be little doubt but that this number will again be doubled during the present year. It must, however,

<sup>1</sup> Monod et Vanwerts: Du traitement chirurgical des péritonitis par perforation dans la fièvre typhoïde. *Revue de Chirurgie*. Paris, 1897, xvii, 169.

<sup>2</sup> Geselevich und Vanakh: On the Operative Treatment of Perforative Peritonitis in Typhoid Fever. *Laitop. Russk. Chir.*, St. Petersburg, 1897, ii, 407.

<sup>3</sup> W. W. Keen: *Surgical Complications and Signs of Typhoid Fever*, Philadelphia, 1898.

<sup>4</sup> W. W. Keen: *Surgical Treatment of Perforation of the Bowel in Typhoid Fever*. *Journal of the American Medical Association*, Chicago, 1900, xxxiv, 130.

be confessed that statistics, for the compilation of which one must depend chiefly upon the bibliography of the subject, will not always represent the actual results, and in all probability the true mortality rate is in excess of that which these figures would indicate, since it is presumable that individual instances of success after such an operation will with greater likelihood find their way into the literature than the isolated cases of failure. Furthermore, so many divers conditions must necessarily be represented in such a statistical *résumé* that the true relations of the question are difficult to estimate; conditions varying all the way from the late evacuation of a circumscribed collection of pus, possibly of appendicular origin and associated with no demonstrable intestinal lesion, to the hopeless case of generalized peritonitis in which the question of the location of the perforation or its association with typhoid plays little part.<sup>1</sup> Be this as it may, however, to have cognizance of thirty-seven actual cases of recovery after perforative lesions of any sort in typhoid fever is sufficient cause for congratulation, no matter what the number of failures may have been, since the complication left to run its own course is almost

<sup>1</sup> The same difficulty confronts us in the statistical study of the surgical treatment of appendicitis. Prompt operative intervention for acute appendicitis is the occasion of the lowest possible mortality rate. Operation for general peritonitis consequent upon perforative appendicitis in which intervention has been delayed is absolutely another question. The combination of these two conditions in statistics naturally makes the percentage of recoveries under the so-called medical treatment approach that of the cases treated surgically. I would suggest, in the future tabulation of the typhoid perforations, that three groups be made: (1) those cases, usually followed by recovery, in which the peritoneal reaction has been sufficient to keep the infection localized for a long time, including presumably many cases of appendicular origin in which the operation has consisted in evacuating an intraperitoneal abscess; (2) those cases of late operation on an advanced generalized peritonitis which rarely recover, and only when the predominating organism possesses a low degree of virulence, and (3), the cases of free perforation recognized and operated upon before the production of a diffuse peritonitis in which the prognosis is dependent upon the promptitude of the intervention and the bacteriological characteristics of the extravasated material. Up to the present time most of the recorded cases fall in the first two categories. In the future it is to be hoped that the majority will be included in the last.

inevitably and promptly fatal. It is to be expected that the local mortality percentage after this operation will be lower even than that shown in the statistical tables in the favorable surroundings of individual hospitals in which risks attending operative procedures are reduced to a minimum, and in which the sentiment on the part of the medical staff is such that prompt surgical intervention in acute abdominal complications of a doubtful nature is regarded as the therapeutic measure worthy of greatest consideration. At the time of this writing, of the twelve cases of perforation which have occurred in Dr. Osler's clinic at the Johns Hopkins Hospital during the past few years and which have been operated upon, five have recovered, a percentage of 41.6. Furthermore, there is little doubt, in the light of our present comparative familiarity with the operative possibilities in perforation, but that some of our seven fatal cases would have been saved to-day, when intervention is undertaken at a much earlier period than formerly, without waiting for an absolute demonstration of the fact of perforation by the presence of a generalized peritonitis, which of itself, in the majority of cases, renders futile all surgical procedures. It has been emphasized heretofore<sup>1</sup> that a distinction should be made in the statistical tables between operation for intestinal perforation in typhoid fever and operation for acute diffuse peritonitis consequent upon such a lesion; the latter condition being the one which up to recent times the surgeon has usually had to confront, the diagnostic signs of which, such as collapse, the presence of free fluid and gas, with the obliteration of liver dulness, the cessation of intestinal peristalsis, etc., occupy the attention of most writers on the subject. Perforations in individuals suffering from profound typhoidal infections may doubtless occur, as Dr. Osler states, and, unattended by any recognizable symptoms, be only brought to light post-mortem; but I am confident that to-day, when no abdominal pain, tenderness, or rigidity of the parietes whatsoever in typhoid cases is passed by without com-

<sup>1</sup> Laparotomy for Intestinal Perforation in Typhoid Fever. The Johns Hopkins Hospital Bulletin, 1898, Vol. ix, p. 257.



ment, that such a calamity is much more unlikely to occur than formerly, and that in the future the diagnosis will be made in these obscure cases in the operating-room rather than on the autopsy table. For example, one of our seven fatal cases operated upon three years ago comes in this category, practically an ante-mortem exploration having been made, disclosing three large perforations and a peritonitis evidently of long standing. It is apparent from the hospital record of this case, however, that symptoms had been present for several days which to-day would be regarded as sufficient to justify operation, symptoms to which no particular importance was attached, and which, as not uncommonly is the case, became less apparent with the intoxication of a generalized peritonitis. Similarly, the analysis by Shattuck, Warren, and Cobb<sup>1</sup> of the twenty-four cases which have occurred in the Boston hospitals during the past five years and have been treated surgically, has shown that abdominal symptoms antedating the so-called diagnostic symptoms of perforation, which are usually those of general peritonitis, have been present, according to the records, in the majority of cases.

Three of our other early fatal perforations probably would have been saved had an immediate exploration under local anæsthesia been considered possible, as is the case to-day. As it was, they were given favorable prognosis, were explored at what seemed to us at the time an early hour, and survived the operation and closure of the perforation for a day or two, to ultimately succumb to an infection which we were a little too late to effectually ward off. As will be emphasized later, there are certain bacterial forms of peritonitis (chiefly streptococcal) which it is absolutely essential to check during the first three or four hours of their progress, and it is impossible to tell, until the abdomen has been opened and a microscopical examination made of the extravasated material, what cases are destined to suffer from an infection with virulent micro-

<sup>1</sup> Shattuck, Warren, and Cobb: A Study of Twenty-four Cases of Typhoid Fever with Symptoms of Peritoneal Infection; Laparotomy. Boston Medical and Surgical Journal. June 28, 1900.

organisms; hence the need of prompt intervention in all. It is a not uncommon experience for us to keep our operating-room ready for immediate use when there is a suspicious "typhoid abdomen" in the medical wards. At the present time, bearing in mind the possibility of recognition of pre-perforative symptoms, the most faithful watch by both house officers and nurses is kept over all typhoid patients whose abdominal parietes present any peculiarities whatsoever suggestive of peritoneal lesion; and it is hardly possible that a perforation or a threatened perforation can escape notice even in patients in profound typhoidal state. I am fully convinced that the adoption of precautions such as we have taken will in the future, in similar surroundings, be the occasion of saving 50 or 60 per cent. of all cases of typhoid perforation.

Owing to the extraordinary difficulties of differentiation at an early hour between perforation and some other complications of the fever, to obtain such a recovery rate will probably mean the occasional exploration of an unperforated case; but it is to be hoped that in a previous communication<sup>1</sup> it has been demonstrated that this should be unattended by untoward complications. In two instances of recent cocaine exploration an acutely inflamed appendix was encountered and appendectomy performed, the operation being indicated whether in association with typhoid or not. On another occasion the abdominal symptoms were due to the involvement of the diaphragmatic pleura by a pneumonia of which no physical signs were apparent at the time of operation. Again, an exploration was made for acute symptoms simulating perforation associated with a double iliac thrombosis. Such errors, however, should become less and less frequent, and, under the operative methods which have been described, an exploration without general narcosis should have no influence one way or another upon the progress of the actual complication; it merely eliminates the presence of a possible perforation, to

<sup>1</sup> Exploratory Laparotomy under Local Anæsthesia for Acute Abdominal Symptoms Occurring in the Course of Typhoid Fever. *Philadelphia Medical Journal*, 1900, v, 501.

await absolute demonstration of which greatly jeopardizes the patient's chances of recovery.

Of the twelve cases above mentioned all have been recorded by Dr. Finney or the writer, with the exception of the three most recent, one of which is made the occasion of this communication. The other cases will be published subsequently by Dr. Mitchell.

CASE, Hospital No. 30,671.—*Typhoid fever with abdominal symptoms from onset. Local peritonitis with pre-extravasation symptoms supposed to be due to a small hæmorrhage. Subsequent laparotomy (forty-five hours later) under local anæsthesia for symptoms of collapse. Closure of perforation. Drainage. Second perforation into wound. Temporary fistula. Recovery.*

The patient, a German boy, twenty years of age, who had been in the country only two weeks, entered Dr. Osler's service on the 29th of May, 1900, complaining of "diarrhœa and vomiting." His mother and one sister have recently died of typhoid fever. His personal history was without note; he had always been well.

His illness began four days before his admission to the hospital, at which time he had been obliged to give up work (he was a baker by trade) and go to bed on account of weakness. He had had some nausea and vomiting on the following day with fever and considerable diarrhœa; five or six movements, he believed.

Physical examination on admission showed a fairly well nourished young man with a natural appearance which could hardly be called typhoidal. His temperature was 101° F.; his pulse not accelerated and of good quality. The only complaint which he made at the time was of slight abdominal pain.

The medical note on the abdomen made at the time of admission reads as follows: "Wall is held rather tense, but there is no spasm; slight distention with a general tympanitic note. The chief pain is referred to the left hypochondriac and lumbar regions. The spleen is readily palpable one and a half centimetres below the costal margin; its edge is firm. There are no rose spots." The leucocytes at this time were 8800.

May 30. Leucocytes, 5000.

From this date the patient continued in a febrile state sufficiently akin to typhoid to justify the usual precautions with

regular administration of baths, etc., though a positive Widal reaction was not obtained for several days. Various notes which were added to the history during the ensuing four days evidence the fact that some abdominal pain and rigidity were always present, unassociated, however, with any apparent tenderness on palpation. The boy invariably "took his tubs" badly; often complained of abdominal pain during the immersion, and was usually somewhat cyanosed after it; once apparently, from the nurse's description, quite collapsed. On an occasion similar to this, though with somewhat more marked symptoms, a surgical consultation was held for the first time, when the following note was dictated.

June 4 (12.30 A.M.). "The patient is somewhat cyanosed; his extremities are cold; he is groaning with abdominal pain and complaining of the tub, from which he has just been removed. He is not sweating. His abdomen is flat, held uniformly rigid, and some slight muscle spasm may be elicited by pressure in the right iliac fossa, where is located his chief complaint of pain and tenderness. There is no dulness in the flanks. The liver dulness does not reach the costal margin by two fingers' breadths. Rectal examination is negative, though disclosing a full bladder. The patient in the next bed states that the boy has hiccoughed once or twice, and a wet stain on the pillow from a mouthful of fluid which he spat up is very acid in reaction." The leucocytes at this time were 10,000, the last count (May 30) having been only 5000. There was nothing peculiar in the patient's attitude. His pulse was at the time 110, of rather poor quality, and his temperature, which two hours before had been 103° F., had fallen four degrees.

Laboring under the disadvantage of not having seen and examined the patient before, and thus being unacquainted with the usual state of the parietes, which under pre-existing circumstances were said to have been uniformly rigid, in spite of the encouragement of the medical attendants, I refrained from an immediate exploration, and apparently was justified in this decision, since during the next few hours the disturbing symptoms practically cleared up. During the night a bloody stool (200 cubic centimetres) was passed, which seemed to satisfactorily explain his upset, and on the following day his condition differed in no respect from that of the preceding.

This upset, which, in the light of subsequent events, un-

doubtedly was occasioned by a pre-extravasation stage of peritoneal involvement, represents the most interesting period of the patient's illness, and, at the risk of interrupting the thread of his history, may bear analysis here. Why, when confronted by such a characteristic symptom-complex of perforation (as this appears to be on paper, at all events), intervention was withheld, may be explained by the mildness of the individual symptoms, and by the unjustified belief, on the part of the surgeon, in his ability to make what is at this period, without opening the abdomen, an almost impossible diagnosis.

The following notes were added to the history during the few hours succeeding, and reading between the lines it is easily seen why operation was refrained from.

(1) "The patient is in some degree *collapsed*; is cyanosed and with cold extremities. He, however, has just been removed from the bath, from which he was on a previous occasion taken in somewhat the same condition. There is *no sweating*, such as is often seen in the collapse of perforation. (2) There has been a *drop in temperature* of several degrees (to 99° F.). A similar drop has occurred after a 'tub' on a former occasion. The temperature, as at that time, has rapidly returned to its usual figure, 104°. (3) *Vomiting*. The patient was not seen to vomit. His cheek and a spot upon the pillow were damp with a fluid which was found to be acid in reaction, suggesting that it came from the stomach. (4) A board-like *abdominal rigidity* is present. This, however, is said to have been the usual condition after the bath. There was no especial *muscle spasm*. *Abdominal movements* were present with respiration. (5) *Pain*. Not especially characteristic, and no more complaint than on previous occasions. (6) *Leucocytosis* of 10,000 counted immediately after his first symptoms. This number has fallen rapidly in the course of a few hours to 4000, which probably represents his usual 'typhoid number.' (The temporary relative leucocytosis and the history of previous complaints of abdominal pain were the two most suspicious symptoms.) (7) *Attitude* not peculiar. Knees not drawn up. No restlessness. Patient is quiet between our examinations. (8) There is considerable *tenderness* on pressure, especially in the right iliac fossa. No dulness on percussion, and several other typhoids in the ward seem equally tender. (9) *Rectal examination*. Tenderness was considerable in the recto-

vesical region. The bladder was quite full, and the patient was catheterized (500 cubic centimetres of high-colored urine). Evacuation apparently caused no pain, and after it much deeper abdominal palpation was allowed than before."

June 4 (continued). During the night the leucocytes fell as follows. When first counted after the onset of the symptoms at midnight, they were 10,000, as stated; at 1 A.M., 9900; at 2 A.M., 5400; at 3 A.M., 5200, and at 4 A.M., 4200. By morning the patient was so much better, and so free from abdominal symptoms in any degree more marked than during his first few days in the hospital, that he was demonstrated to the clinic as a case of simulative perforation. At 3 P.M. he passed a few blood-clots, and at 5 P.M. 200 cubic centimetres of blood clotted and liquid. This was believed to be the "tell-tale" of the disturbance the night before.

June 5. Patient passed a fairly comfortable night. His condition apparently was unaltered. During this day he seemed dull and drowsy, though with no appreciable change in abdominal symptoms. Late in the afternoon, however, his general condition became somewhat worse. At 5.30 P.M., the leucocytes, which had not been counted previously during the day, were found to be 17,000, and he vomited a small amount after taking nourishment.

At 7 P.M. the leucocytes were 14,500; at 8 P.M., 14,000. A positive Widal reaction had been obtained for the first time on this date. He rapidly grew much weaker; he was very dull; his pulse very feeble, 140. Evidently, some critical change for the worse had taken place, and, though there was apparently less indication of a peritoneal lesion than there had been forty-five hours before at the time of the sudden upset above described, an exploratory laparotomy was with reluctance determined upon.

June 5, 9 P.M. Operation under local anæsthesia after one-eighth grain of morphia.

*Exploratory laparotomy. Perforation in ileum with recent extravasation into general cavity. Closure of perforation. Irrigation. Drainage. No shock.*

With Schleich's infiltration method (1 to 1000 cocaine), an oblique incision was made over the situation of the appendix. On opening the general cavity, evidences of a local peritoneal reaction of many hours' duration were encountered. The cæcum, lower part of the ileum, and the parietal peritoneum over the

right iliac fossa were covered with fibrin, the oldest and most marked degree of peritonitis being in this situation. The appendix, which was involved in this process, showed no external evidences of ulceration. Several ounces of pus were present between the coils of bowel in this corner of the abdomen. After carefully wiping out this exudate and taking cultures the ileum was then examined, and almost the first coil which was drawn out into the wound showed a perforation about one-half by one centimetre in its diameter. This was situated possibly eight centimetres from the cæcum. It was immediately closed by a double row of sutures. Beyond this perforation, the ileum, which was deeply injected, showed evidences for several centimetres of underlying deep ulcerations, many very thin areas corresponding to Peyer's patches threatening immediate perforation. It would have been impossible to have inverted all of these areas. The pelvis contained several ounces of turbid seropurulent fluid, which a microscopical examination showed to contain only leucocytes and numerous bacilli; no streptococci. The general cavity was irrigated for half an hour with Ringer's solution by means of large tubes introduced among the coils in various directions.

*Closure.* Owing to the threatening appearance of the lower part of the ileum, the omentum, which fortunately was long, was wrapped about the most suspicious looking coil, ten or twelve centimetres in length, and caught in place by one or two fine intestinal sutures. This portion of bowel was then placed parallel with the abdominal wound and held loosely in position by means of gauze, with the view of having it under control should it be desired subsequently to establish an artificial anus in case of intestinal paralysis from peritonitis, and also to enable a subsequent perforation, should one occur, to have exit by way of the wound. The two ends of the incision were closed. During the entire operation, which was performed leisurely and lasted over an hour, the patient made absolutely no complaint of pain, although greatly frightened when taken to the operating-room and objecting to the preliminary hypodermic of morphia and the first insertion of the infiltration needle. His condition, especially during the long irrigation, greatly improved, and he left the operating-table with a much better pulse and general appearance than he had brought to it.

The postoperative history may be dismissed with a few

words. The day after the operation there was considerable distention, which was relieved by turpentine enemata. His post-operative leucocytosis persisted for a couple of days, apparently due to an infection of that part of the parietes which had been closed. As is often observed, an abdominal incision which has been soiled during such an operation takes care of micro-organisms less well than the underlying peritoneum. The wound had to be laid open its full length, disclosing an infection of the muscle and panniculus. The postoperative observations on the leucocytes are as follows:

June 5, 8 P.M., 14,000 (before operation).

June 6, 11 A.M., 17,400; 10.30 P.M., 15,600.

June 7, 11 A.M., 14,000; 9 P.M., 9000.

June 8, 10 A.M., 7000; 6 P.M., 4000.

June 9, 6 P.M., 4500.

June 10, 5 P.M., 3000.

June 11, 6 P.M., 3000.

Two days after the laparotomy the patient's abdomen was soft and free from rigidity for the first time since his admission to the hospital. On June 14, eight days after the operation, at a point of the bowel exposed in the lower angle of the wound just proximal to the coil which had been covered by the omental graft, a thin area gave way, and a faecal fistula developed which persisted for some time. The abdominal wound, owing to the necessity of abandoning the sutures at the angles, had gaped considerably, and it was possible to keep under observation the underlying loop of ileum. The omental graft played its part well and possibly saved that part of the bowel from other perforations; an imitation of nature's method of protecting such surfaces. The wound had closed, and the patient was discharged from the hospital early in August.

The necessity of acknowledgment in this particular case of an error of judgment on the part of the operator, and his failure to take advantage of that very stage which has been heretofore described as the elective one for intervention, perhaps emphasizes the more what may be given as the rule to follow in these cases, namely, "*when reasonably in doubt, explore.*" By good fortune alone was delay in this instance not followed by disastrous results. The character of the peri-



tonitis encountered at the operation leaves it beyond doubt that a peritoneal lesion had existed, possibly for some days, and had been protected by neighboring adhesions. At the time of the exacerbation of the abdominal symptoms there probably had been some increase consequent upon the bath in this local reaction which again subsided. An analogous condition is often seen in the temporary spread of a circumscribed appendicular peritonitis. The occasion of final giving way of adhesions with extravasation of pus and intestinal contents into the free cavity was unassociated with pronounced abdominal symptoms, only with general symptoms of collapse. It probably occurred not many hours before our exploration. Just such cases as this were the ones which formerly were brought to light at the autopsy table, comparatively mild and neglected preliminary abdominal symptoms merging inappreciably into those of an unrecognized general peritonitis.

The frequent association of hæmorrhage from the bowel in cases of perforation has been brought out by the careful analysis of Shattuck, Warren, and Cobb, it having occurred in more than one-third of their series. It is possible, therefore, that this symptom should have been regarded by us rather as favoring the presence of a perforation than taken in itself as the occasion of the symptoms.

The case furthermore may be offered in illustration of that fact which the statistical study of the successful cases has brought to light, namely, that the greatest percentage of recoveries has occurred among those cases operated upon during the period from eight to twenty-four hours after evidence of perforation. A natural explanation is that patients who have for that length of time survived the perforation, and still are regarded as fit subjects for surgical intervention, either have suffered from a mild bacterial infection or else the process has been one slowly progressive and well combated by peritoneal reaction. It is interesting in this connection to learn from the statistics the number of recoveries which have attended operations performed at a comparatively late hour (all unfortunately without bacteriological observations), and to see of this number

in what a large percentage the operation consisted in exposing a circumscribed abscess, and in how many instances, therefore, failure to find the perforation is recorded. This naturally means a very mild bacterial process occasioning a localized peritonitis of the adhesive variety. To await the reaction which may follow the collapse of perforation and extravasation is another way of distinguishing between the favorable and unfavorable cases, viz., those which improve sufficiently to be considered fit subjects for operation after several hours and those which do not. The latter are presumably rarely operated upon, since the condition, for want of a better term called shock, merges imperceptibly into that of a profound septicæmia, which is even more unfavorable from an operative stand-point.

Fortunately, for this particular patient, the actual perforation was unassociated with the extravasation of organisms other than of bacillary types (*B. coli communis* was alone isolated). Had the existing flora of the intestine been rich in streptococcal forms, an operation only at the time of the pre-extravasation symptoms could with any degree of probability have warded off a fatal issue.

# OPERATIVE PARALYSIS OF THE SPINAL ACCESSORY NERVE.

By PEARCE BAILEY, M.D.,

OF NEW YORK,

ASSISTANT IN NEUROLOGY, COLUMBIA UNIVERSITY; CONSULTING NEUROLOGIST TO THE ST. LUKE'S AND ORTHOPÆDIC HOSPITALS.

THE chief clinical importance of paralysis of the spinal accessory nerve is surgical. The nerve has a long course in the neck and traverses a region often invaded by tumors, especially by those originating in the lymph nodes. Whether they be suppurative, tuberculous, or cancerous, such tumors are usually diffused and tightly bound down to surrounding structures. At the time of their removal there is more or less chance of the nerve being cut, either by accident or intentionally for the purpose of thorough extirpation. Within the past year two instances have come to my notice of accidental section of the nerve. In both, serious disturbances of motion in the trapezius and sternomastoid immediately followed the operation. Such a result contradicts the more common experience, for in most cases the paralysis which results from section of the nerve is not particularly disabling. Large pieces of the nerve are resected for spasmodic wry-neck without fear of serious loss of motor power; and in only a few of the reports of accidental section is any mention made of paralytic results of consequence. This is explained by the fact that the cervical nerves commonly participate in the supply of the trapezius, so that this muscle is usually paralyzed in part only, and then in a way to not seriously interfere with movements of the shoulder and arm. Also, when the sternomastoid is totally paralyzed, freedom of movement of the head and neck is impaired, but it is not abolished. Even when both

muscles are entirely put out of service, the erect position of the head is not seriously interfered with. In the two cases referred to as seen by me the paralysis which resulted from accidental section of the spinal accessory was much more disabling than usually met with as a result of such an accident. With the view of determining the reason of the varying results from a common cause, I was tempted to turn again to the well-worn subject of the nerve supply of these two muscles.

The old terminology and conception as to the function of the accessorius have recently been called into question. On experimental evidence, it is now regarded as a spinal nerve pure and simple, and the cells of origin in the medulla, primarily ascribed to it, are believed to belong to the vagus. There is little reason to doubt that this allocation is correct. The purposes of the present paper can best be served, however, by retaining the old nomenclature, as is done in most anatomies. The spinal portion of the nerve which is destined for the sternomastoid and trapezius, and which is represented by the external branch, springs from the upper five cervical segments of the cord. The accessory portion, soon after its exit from the jugular foramen, sends its fibres, through the internal branch, to the vagus, to join in the nerve supply of the pharynx and larynx. Paralysis of the nerve, consequently, presents a varying symptomatology, according to the site of the lesion. If the spinal portion alone is affected, the trapezius and the sternomastoid show a loss of power, without symptoms referable to the larynx and pharynx. Among the producers of such a condition are, outside the cord, fracture of the cervical vertebræ, cervical caries, syphilitic pachymeningitis, and such diseases as syringomyelia, locomotor ataxia, progressive muscular atrophy, and traumatic hæmatomyelia.

Within the skull, after the spinal and accessory portions have united, symptoms due to affections of both portions may result from basal lesions generally. The division of the nerve into an external and internal branch, of which the former goes to the sternomastoid and trapezius, and the latter through the

vagus to the larynx and the pharynx, occurs immediately after exit from the cranial cavity; therefore, an injury outside the skull, to cause symptoms referable to both branches, must be situated directly at the skull base. The present paper concerns itself almost entirely with extracranial affection of the nerve. With the rare exception of penetrating wounds at the base of the skull, extracranial lesions of the spinal accessory are always confined to the external branch, and are nearly always traumatic. I have found no record of the nerve having been compressed by new growths in a way to cause paralytic symptoms. Neuritis in this nerve is rare.

In the following two cases the paralysis was the direct result of surgical operation.

CASE I.—The patient, a young girl, was seen at the New York Orthopædic Hospital in November. There was a scar extending downward, two or three inches from the mastoid process, along the anterior border of the sternomastoid muscle. The patient said this was the result of an operation undergone a few weeks previously for enlarged glands. The right sternomastoid and trapezius muscles were paralyzed, and there was slight anæsthesia of the back of the ear. Much to my regret, the examination of this patient was cursory, as I intended to make a more thorough one before the operation of neurorrhaphy, which I advised. The patient did not return to the hospital, however, and we have been unable to find her. From memory, however, I can say that she had complete paralysis, with atrophy, and degenerative electrical reactions in the sternomastoid and upper part of the trapezius. The right arm hung down, the head could not be turned to the left, and there was great loss of power in elevating the shoulder. The middle portion of the trapezius was not examined. I cannot say whether it was paralyzed or not.

CASE II.—The second case is one of more than ordinary interest. The patient, a robust workman, was operated upon in March, 1900, for a deep suppurating gland of the right side of the neck. The incision was along the anterior border of the sternomastoid process, not over one and one-half inches in length. Soon after the operation, impairment of motion about the right shoulder was observed, and on April 9 I made an examination at

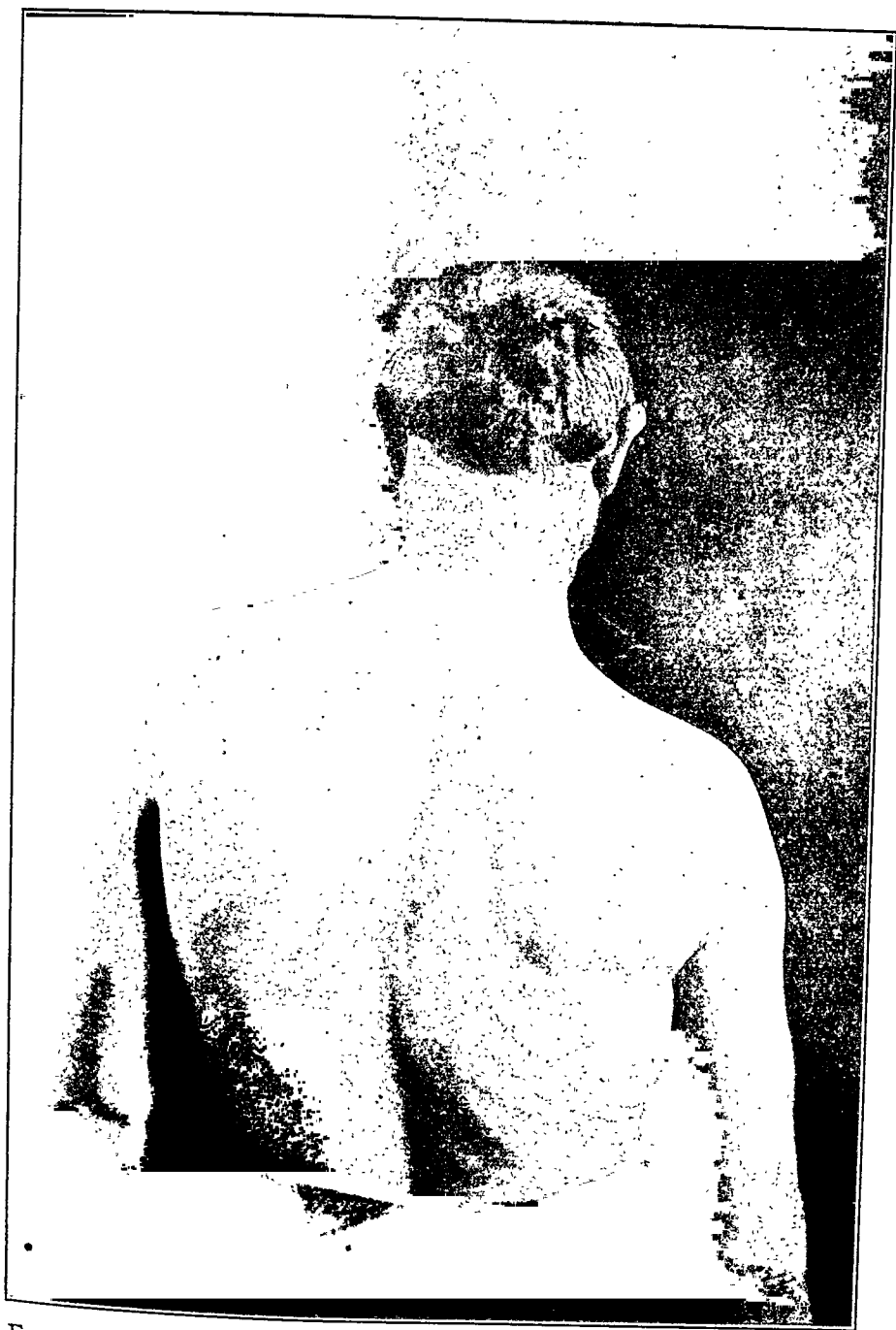


FIG. 1.—Case of total paralysis of the right spinal accessory nerve, showing drooping of the shoulder, rotation of the scapula, and atrophy.



the Vanderbilt Clinic. The patient presented a classical picture of unilateral paralysis of the sternomastoid and trapezius muscles. The head was inclined slightly forward, the shoulder was depressed, the arm hung heavily with slight forward rotation, the scapula was drawn away from the spine and rotated on its horizontal axis, and there was a slight scoliosis, with convexity towards the left. The part of the neck and shoulder normally formed by the trapezius was greatly lessened in volume. This caused a sinking of the line extending from the occiput to the acromion process, and a loss in the fulness of the base of the neck on the affected side. (Fig. 1.) Voluntary movement and electrical reactions were normal in all muscles except the right sternomastoid and trapezius. These two muscles were totally paralyzed and presented degenerative electrical reactions. The patient was unable to turn the head to the left and had difficulty in bending the head forward. The affection of the trapezius was shown by great disability in raising the shoulder and in adducting the shoulder-blade. The arm could not be elevated much above an angle of ninety degrees. The resulting incapacity was extreme. The patient was practically deprived of the use of his right arm for all heavy work. I wish to particularly emphasize this in showing how serious a calamity to any one, but especially to a laboring man, complete paralysis of the trapezius is. Forming, as it does, the most important support of the shoulder, the loss of the trapezius practically does away with the power of lifting weights which are at all heavy. The deltoid, in losing its support, loses much of its usefulness, and lifting must be done by the flexion of the forearm and by a bending of the whole body. The patient in the present case has been, ever since the onset of his palsy, completely incapacitated for his work. As far as sensory symptoms are concerned, there was no pain. But the patient complained of a feeling of numbness about and behind the left ear. Examination showed that there was a diminution in tactile sensibility in this region. There was no doubt as to the diagnosis. The right spinal accessory nerve had been accidentally cut during the operation, and with it the great auricular nerve.

Neurorrhaphy was performed about six weeks after the original operation. The cut ends of the nerve were found to be considerably separated, an inch or more. Within a few weeks from the suturing, the electrical reaction improved. At present



(December, 1900) there is still a great diminution in faradic excitability, but there is no longer any reversal in the reactions to the galvanic current. The improvement in motor power has been slow. This patient suffered a peculiar complication in the shape of partial palsy of the circumflex and musculospiral nerves. This came on months after the original operation. It was due to pressure during sleep. The man admitted sleeping on his arm, and as soon as his attention was called to the danger of the proceeding, these palsies began to improve, and are now well on the way to recovery.

The chief interest of this case to me has been the probability of its casting some light upon the vexed question of the nerve supply of the sternomastoid and trapezius muscles.

While some authorities state that the spinal accessory supply to both muscles is reinforced by the cervical nerves, the more recent views seem to agree that the sternomastoid, at least, gets its sole innervation from the accessorius, but that the trapezius is supplied by some of the cervical nerves which pierce it. There does not seem to be an agreement of opinion as to which these cervical nerves are, nor as to which of the three parts of the muscles they are distributed. For example, Oppenheim states that the clavicular portion of the trapezius is the one most frequently supplied by means of cervical branches, while Remak believes that it is the middle portion. Indeed, Remak has gone so far as to maintain that total palsy of the trapezius does not occur as a result of section of the spinal accessory, either within the skull or directly after its exit from the jugular foramen. He believes that the characteristic falling away from the spine of the upper internal angle of the scapula (*Schaukelstellung-mouvement de bascule*), which results from paralysis of the middle portion of the muscle, is invariably dependent upon lesion of the cervical nerves; and that when the spinal accessory is the only nerve affected, this portion of the trapezius is spared. In support of this opinion he adduces a case in which, after section of the nerve soon after its exit from the skull, the middle portion of the trapezius was not paralyzed.

It is, however, rather dangerous to make too absolute claims in regard to nerves whose function is still uncertain, and especially in regard to nerves which enter into plexus formation.

Remak's position is rendered untenable by the second case of my series. Also Freund quotes a case reported by Mann, in which bilateral and total palsy of both trapezius and sternomastoid resulted from operation for bilateral cervical glands. The details of this case as to the site of the operation, etc., are not given, but Mann says, "in view of the situation of the

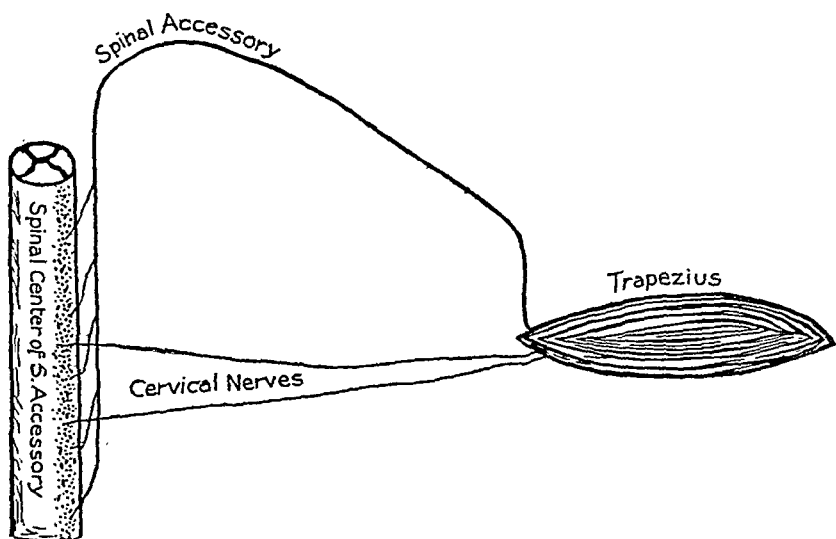


FIG. 2.—Showing the usual nerve supply of the trapezius. In exceptional cases the cervical nerves do not enter into this supply. Then all motor impulses pass from the spinal cord to the muscle by means of the spinal accessory.

lesion, a lesion of the accessorius is the only one which can be held responsible for the condition." Still more convincing is a case of Traumann's, in which the nerve was divided by a stab wound so close to the base of the skull that the internal branch of the accessorius was also cut—*i.e.*, well out of the region of the cervical nerves. There resulted palsy of the sternomastoid and of all portions of the trapezius. The complete palsy of the trapezius proved that it had received its whole supply from the spinal accessory.

These conflicting reports can only be harmonized by as-

suming that occasionally there is a variation from the customary route by which the motor impulses pass from the spinal cord to the trapezius. Such an assumption receives some support from the fact that the trapezius is not, in its anatomical relations, a fixed muscle. In man it may be congenitally absent in whole or in part; in the lower apes it is supplemented by another similar muscle called the spinocervicalis.

It has been shown by embryological researches that the relationship between the neural segments and their corresponding muscle segments is constant and not subject to change; that whatever other variations occur there are none between individual neurotomes and the myotomes they are destined to supply. But anatomy abundantly teaches that the route by which these segmental elements are associated is more or less elective and subject to variation. In the case of the trapezius, I take the variation to be as follows (Fig. 2):

The spinal centre situated between the first and fifth cervical segments of the cord is fixed and constant. As a general rule, the cells of this centre send their axones to the trapezius through both the spinal accessory and the cervical nerves. But sometimes there is a variation from this arrangement in that all the axones pass to the muscle in the spinal accessory, leaving the cervical nerves without function, as far as the trapezius is concerned. Under these circumstances, the motor impulses reach the trapezius exclusively through the spinal accessory, and section of it consequently means total palsy.

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# HYDATID CYST OF THE PROSTATE.<sup>1</sup>

BY L. BOLTON BANGS, M.D.,

OF NEW YORK,

PROFESSOR OF GENITO-URINARY SURGERY IN THE UNIVERSITY AND BELLEVUE HOSPITAL MEDICAL SCHOOL; SURGEON TO BELLEVUE HOSPITAL.

THE following case is presented not only because of its rarity, but because of the questions of diagnosis involved.

I have called it an "Hydatid Cyst of the Prostate" because I can come to no other conclusion in regard to its anatomical situation. The following history is taken from the records of my service at Bellevue Hospital.

G. H., thirty-nine years of age, single, a laborer, born in Germany, living at 105 Bowery. Admitted to Bellevue Hospital October 13, 1900. Pulse and temperature normal.

Patient denies all venereal history. He says that he never had difficulty in making urine until the present acute attack. On Thursday, October 11, first noticed that he was passing very little urine. On Friday morning he had considerable pain in the region of the bladder, but was still able to pass a little urine. By Friday afternoon, October 12, the pain was intense and the retention was complete. The last urine was passed Friday evening, October 12, just before dark, and the quantity was very little. The patient was admitted to Ward 4 on Saturday morning, October 13, at 12 A.M. He was in great pain; his abdomen was immensely swollen, and the outline of the bladder could be made out above the umbilicus. He was catheterized by the House Surgeon at 12 A.M., and sixteen ounces of pale, clear urine were withdrawn. This operation was repeated at intervals of about two hours for the first twenty-four hours, more and more urine being taken each time. It was found that 162 ounces of urine had been secreted in

<sup>1</sup> Read before the New York Surgical Society, January 23, 1901.

the twenty-four hours. This was repeated until on the second day, namely, October 15, the bladder was gradually and finally emptied, and he voided spontaneously two ounces. It was the first that he had passed spontaneously since entering the hospital. The House Surgeon reported that, although the bladder was apparently empty, there was a large tumor in the hypogastrium, extending over into the patient's left inguinal region.

He was examined by Dr. Bangs at 3.30 in the afternoon of Saturday, the 15th. His urethra was irrigated with boric acid solution; a soft catheter was then introduced and his bladder emptied, sixteen ounces of urine being withdrawn. It was observed that the catheter entered to an unusual degree before reaching urine; and the length of the urethra, that is to say, the length measured on the catheter from the point at which the urine flowed to its fenestrum, was ten and a half inches. A searcher was then introduced, and when its beak reached the prostatic urethra, the instrument rotated to the patient's right through an arc of, say, fifty or sixty degrees, and some manœuvring was necessary before it would enter the bladder. Searching of the latter was negative, excepting that all movements of the instrument were limited on the patient's left.

October 16. It is still necessary to catheterize the patient about every four hours, but once during the day he voids spontaneously six ounces of urine. The patient is kept absolutely quiet in bed, and is receiving seven and a half grains of urotropin three times a day.

October 17. Patient voided twelve ounces spontaneously in these twenty-four hours. The patient is again examined; the bladder is completely emptied by the catheter, and then palpation shows a tumor occupying part of the hypogastrium, beginning three fingers' breadth to the left of the median line and extending thence into the left inguinal region for a distance of four and a half inches; it extends upward in these same regions nearly to a line drawn horizontally through the umbilicus. With two fingers in the rectum, the prostate is felt to be normal on the patient's right, but the left lobe is round, much larger than the right, and its posterior and lateral margins cannot be defined from the mass in the pelvis with which it seems to be continuous. Bimanual pressure either elevates or depresses the whole tumor, according as the pressure is made against the left lobe of the

prostate with the fingers in the rectum, or with the other hand over the hypogastrium. It is spherical in shape, and there is a distinct sensation of elasticity conveyed to the fingers, but no sensation of fluctuation, fremitus, or ballottement. It seems to be connected with the prostate.

Urinalysis by Dr. Goldhorn, pale, acid, 1012; urea, 1.5 per cent.; albumen, faintest possible trace; no sugar; sediment, very scanty; shreds of mucus, embedded in which are many leucocytes, small cells, and spermatozoa; a few crystals of calcium oxalate. The patient has been gradually resuming spontaneous urination until, on October 23, one catheterization during the twenty-four hours shows residual urine in the bladder of five ounces. Patient seen in consultation by Professors B. Farquhar Curtis and A. A. Smith, who agreed that exploratory operation was necessary to determine seat and nature of tumor.

October 29. Residual urine one ounce and a half.

November 2. Patient was operated upon by Dr. Bangs, assisted by Dr. B. Farquhar Curtis, and the enlargement of the left lobe of the prostate verified with the searcher by Dr. Curtis. The bladder was entirely emptied by the catheter. A vertical incision in the median line three inches in length; the tumor was exposed and found to be continuous with the left lateral hemisphere of the bladder. In order to examine it thoroughly, the incision was extended upward to the umbilicus and downward near the pubes. The hand could be passed around the tumor upon its upper aspect, and a few small and easily separated adhesions to the intestines were found; its left lateral aspect was free for its upper third, below this it was firmly attached to the tissues of the pelvis. The large iliac vessels could be felt distinctly adherent to its outer surface, curving around its spherical circumference. The finger could not be introduced between the tumor and the rectum, nor between it and the bladder, nor between its anterior surface and the inner surface of the descending ramus of the pubic bone. The abdominal cavity was shut off with pads; an aspirating needle was introduced in the tumor and twelve ounces of a clear, serous fluid were withdrawn. A trocar and cannula were then introduced and some eight ounces or more were evacuated, but some of the fluid was lost. The tumor contained possibly in all about twenty-five ounces of fluid.

The tumor was then brought up into the wound, widely laid

open, and many collapsed secondary cysts found in it and removed. About twenty of these appeared to be complete. Others were in fragments, which made it impossible to estimate the total number of the secondary cysts. Four or five "pearls" were found. The inner lining of the sac was rubbed dry and all the cysts cleared away. It was found to be impossible to remove the sac, therefore the edges of its opening were stitched with silk to the abdominal wall in the lower fifth of the incision; two drainage tubes were inserted in the sac, and the abdominal wound closed. Microscopic examination showed the presence of hooklets and many secondary cysts in the fluid evacuated from the tumor.

November 4. Wound clean. Slight amount of thin fluid from the drainage tube.

November 8. The patient has been dressed daily; primary union of the abdominal wound. Cavity of the sac washed daily with 1 to 5000 bichloride. Discharge from the interior diminishing daily.

The cavity rapidly diminished in size, leaving a narrow sinus, which finally entirely closed about the 1st of January, 1901, say, in about eight weeks.

In my opinion, the case is one of prostatic origin for the following reasons:

(1) The length of the urethra, viz., ten and one-half inches, in a young man of thirty-nine years of age in whom were no evidences of an inflammatory process.

(2) The obstruction to urination was at the neck of the bladder and in the situation of the left lobe of the prostate, the latter being found to be asymmetrically enlarged.

(3) The notable rotation towards the right of the beak of the searcher as it came in contact with the left lobe of the patient's prostate, and the left lateral deflection of the handle of the instrument to enable its distal end to curve around (so to speak) the obstruction.

(4) The situation of the tumor as determined by digital examination by the rectum, as verified by two other observers; but this is admittedly inconclusive.

(5) The findings at the time of the operation.

A careful search of the literature within our reach has

been made for me by Dr. Goldhorn, and it is interesting to note how few cases of this seat of hydatid cysts are on record. Out of twenty-three cases of hydatids of the pelvis tabulated by M. Nicaise (*Bulletin de la Société de Chirurgie*, in 1884), there are but seven which have any close relation to the prostate, and the diagnosis is so doubtful that Henry Thompson does not hesitate to say, "It is doubtful if hydatid cysts have ever been met with in the prostate." He is inclined to think "that all cases of hydatid of the prostate are cases of hydatids between the bladder and the rectum, the prostate gland having been more or less absorbed by pressure from an external cyst, so that the latter came at length to occupy the seat of this organ."

Notwithstanding this ingenious argument of Sir Henry Thompson, with which he attempts to throw doubt upon the situation of the tumor, there are three cases which we have been able to find which seem to me to correspond with mine and fortify me in the diagnosis which I feel warranted in making. There may be others, but I have not been able to find them.

It may be interesting to quote these somewhat *in extenso* in order to compare them with the case which I have just presented to you. (Extract from *Transactions of the Medico-Chirurgical Society*, Vol. xxix, p. 253, Anno 1846, George Lowdell, Esq.)

J. J., aged sixty-four years, Sussex County Hospital, July, 1884. A history of three or four years of difficult urination, with frequent desire; of late almost complete retention of urine. Bladder emptied by catheter after great difficulty; three pints of urine withdrawn; much mucus and pus escaped afterwards. He died in a few days.

*Post-mortem*.—Bladder much thickened; in situation of prostate, a tumor larger than foetal head, which, when cut open, proved to be a hydatid cyst closely packed, the true substance of the prostate being lost in it. Hydatid tumors were also found in the omentum.



Whether the hydatid cyst was formed in the prostate itself or external to the organ, destroying it by pressure alone, is stated to be a matter of doubt. Appearances led Mr. Lowdell to the former view. Mr. Lowdell expressed this belief, but added that he "should be scarcely warranted in maintaining that opinion without question," because hydatid disease of the prostate was not on record, and that there were other tumors in the omentum. Just what the latter fact had to do with the development of doubt in his own mind, I do not see.

M. Tillaux reported to the Société de Chirurgie in 1883 the following case:

Man aged forty-three, a waiter, who entered hospital September 23, 1882, and was discharged November 3. For a year past patient has had to get up frequently at night to micturate; constipation and diarrhoea have alternated for about two years; hence these symptoms preceded the bladder symptoms for about a year. The patient cannot work on account of pain in his back at the level of the sacrum, and he defecates only with great difficulty. He entered the hospital on account of retention of urine. Examined by M. Tillaux on September 29, a rectal examination showing a voluminous prostate, entirely smooth, the two lobes blended, and no median furrow can be made out; consistency elastic; fluid seems to be present. Two fingers could not be introduced so as to be able to induce fluctuation. A little pain upon pressure. The tumor seems to be equally voluminous anteriorly. The hips of the patient were elevated by means of a bolster, and an effort is made to introduce a metallic catheter, but he can only reach with the point of the instrument the internal orifice of the urethra, and barely a few drops of urine are obtained. Although the bladder is full of urine, no kind of catheter will enter, and M. Tillaux gave up all efforts at catheterization.

It is stated that the patient has in the right lateral region of the thorax a cicatrix of a cold abscess; the diagnostic inference is therefore made that the liquid in the prostate might be a cold abscess.

On the 9th of October an incision into the rectal face of the prostate was made with a bistoury, which was guided by the

finger; a clear liquid, resembling urine mixed with blood, ran out. M. Tillaux put his finger into the sac to a depth of six or seven centimetres; the sac seemed to be divided into chambers.

On the 10th the patient passed clear urine, but with difficulty; and this A.M. the bladder was distended with urine. He had pains in the abdomen, some fever, and, briefly, symptoms of peritonitis.

October 12. Urination free. Patient passed per rectum a membrane resembling a hydatid.

October 13. More hydatid membranes per rectum.

October 16. Urinates freely.

October 17. Rectal digital examination shows the prostate to be still somewhat voluminous. The incision can be felt, and it has not yet closed.

On the 3d of November the patient left the hospital for his home.

A discussion ensued which shows the difference of opinion existing in regard to these cases. Tillaux says that this is a very rare case; that Le Dentu tried to show that hydatid cysts of the prostate do not exist, but he claimed that no doubt exists in this case. M. Marche thinks it advisable to be certain that the cyst was not in the cellular tissue between the rectum and the bladder. M. Lannelongue thinks the cyst might have been in the muscular tissue of the rectum, and thus have given rise to the phenomena reported. M. Perrier agreed with these two gentlemen; quotes Davaigne (*Traité des Entozoaires*), who describes some cysts of the true pelvis which have given rise to similar phenomena; M. Tillaux insists that his cyst was located in the prostate, and, moreover, that it was in the glandular tissue of the organ.

Another case was that of M. Millet, reported by M. Nicaise to the Société de Chirurgie in 1884.

M. Millet was called to see a patient on July 16, 1882, who had retention of urine; patient was aged fifty-nine; he had had difficulty in urination for an indefinite period. The existence of a voluminous tumor occupying the region of the prostate was established. Attempts were made to catheterize the patient with

different catheters, and, finally, a soft rubber one entered the bladder. There was recognized in the right iliac fossa a globular, hard, and regular tumor. Rectal examination shows that the pelvis is filled by a tumor occupying the right side, and that it pushes the rectum backward and towards the left. This mass is of a resisting nature, and conveyed to Dr. Millet the idea that it was a cyst. The patient has been experiencing difficulty in defecation for a long time. Dr. Millet sent the patient to Dr. Nicaise. The latter found upon rectal examination, at the site of the prostatic region, a voluminous tumor, regular in its outlines, tense, movable, and covered by the rectal mucous membrane. He hesitates as to the diagnosis, but believes it to be a cyst.

The patient received instructions as to the use of a catheter, etc., but six months later Dr. Millet was again called to him to relieve a retention of urine of twelve hours' standing. It was found impossible to introduce a catheter; the bladder was therefore punctured and more than a quart of urine withdrawn. Rectal examination shows the presence of the tumor previously noted. As the patient lives at a distance, another attempt is made to pass a metal catheter; suddenly M. Millet feels the tip of the instrument press upon a stretched membrane; a rent is produced, and at the same moment a pint of liquid, clear as water, gushes through the catheter; not a drop of urine follows. The quantity of fluid amounts to about 700 cubic centimetres, and it contains a little albumen. The patient now urinates without difficulty. After a few days the patient's urine became foul-smelling, and he had marked dysuria. Small membranes of a milky-white color were passed by the urethra. These continued for some days, until February 20, when on that day he had violent colic, followed by diarrhoea (the patient had eight to ten stools per diem), and he passed from the rectum membranous *débris* and little white vesicles. From the onset of this diarrhoea, namely, the 21st of February, the urine had been normal; the diarrhoea ceased in a few days, and the patient made a rapid recovery.

In neither of these cases is there any record of the careful steps which are necessary to establish a diagnosis of a lesion of the prostate. In my own case, with the exception of cystoscopy, a careful and methodical diagnosis was made.

A few words may be added as to the patient's present condition. A digital examination of his prostate by the rectum shows that a small and normal prostate can be defined, but a sausage-like mass can be felt extending from the posterior edge of the left side of the prostate backward and upward as far as the finger can reach. Although the posterior margin of the left lobe of the prostate is well defined, a little deeper pressure will determine that it is blended with the lower extremity of the mass. Furthermore, when a searcher is introduced into the bladder, its beak is still rotated to the patient's right on reaching the level of the prostate.

# THE SURGICAL TREATMENT OF AMŒBIC DYSENTERY.<sup>1</sup>

By FRANCIS W. MURRAY, M.D.,

OF NEW YORK,

PROFESSOR OF CLINICAL SURGERY, CORNELL UNIVERSITY MEDICAL COLLEGE;  
SURGEON TO NEW YORK HOSPITAL AND ST. LUKE'S HOSPITAL.

A CONVENIENT and satisfactory classification of the cases of amœbic dysentery is that adopted by Councilman and Lafleur, and which is based on the severity of the symptoms. The cases, accordingly, may be classified as, first, dysentery of moderate severity; second, grave or gangrenous dysentery; third, chronic dysentery. It is to the last class that I wish to draw attention, and the object of this brief paper is to advocate the treatment of the chronic cases by surgical methods. It should be understood, however, that surgical treatment is not recommended in all chronic cases, or even in the earliest stages of this variety; but it should be resorted to in the cases which fail to respond to medical treatment after its trial for a reasonable period of time. It should be added, also, that the cases under consideration are the uncomplicated ones. *i.e.*, where the lesions are limited to the colon. These chronic cases may be of moderate severity or mild to start with, but the course of the disease, irrespective of the mode of onset, is characterized by an irregularity of the dysenteric symptoms. There will be an intermission of varying duration, and the improvement in the symptoms will be ascribed to the medical treatment, and hopes are entertained that the disease is at last cured. Suddenly, however, without any apparent cause, an exacerbation follows, the stools again become dysen-

<sup>1</sup> Read at the meeting of the Hospital Graduates' Club, October 25, 1900.

teric, and the fond hopes of cure are dispelled. Thus the disease continues, the patient steadily loses strength and flesh, becomes more anæmic, and, if not carried off by hepatic abscess, finally dies of exhaustion or succumbs to some intercurrent disease. Just how many of these chronic cases are cured by medical treatment it is difficult to say, but probably only a very small percentage, judging from the inherent chronicity of the disease, as well as from the frequent occurrence of hepatic abscess. The explanation of the want of success by medical treatment is to be found in the fact that our therapeutic measures are incomplete and fail to meet all the indications necessary for a cure. The fact may, perhaps, be better appreciated after a brief consideration of the etiology of the disease as well as of the lesions of the colon which are present in the chronic cases.

The cause of amœbic dysentery is most likely due to the presence in the colon of the amœba dysenteriaë, a species of protozoa; and while complete proof may be wanting,—and some opposition to the view still exists,—it must be admitted that the views of Councilman and Lafleur as to the etiology of this form of dysentery are highly conclusive. The pyogenic organisms, the streptococci, also play an important part in the development of the disease and assist materially in the destructive action of the amœbæ. The amœbæ gain access to the body in food and drink, pass through the stomach and small intestine, where the conditions are unfavorable for their growth, and finally enter the large intestine. An interesting fact is that one of the essential conditions favorable for their increase is that the reaction of the material in which they grow shall be alkaline. On arriving in the large intestine they rapidly multiply and invade the mucous membrane of the bowel. After passing through the mucous coat they enter the submucosa, and it is here that they display their greatest activity. The submucosa becomes œdematous, swollen, and softens and breaks down into a yellow gelatinous pus. The mucous membrane above, deprived of its blood supply, becomes necrotic and is cast off, exposing an ulcer, the base of

which is the softened submucosa. The yellowish gelatinous submucosa is in turn cast off as a slough, thus exposing the muscular coat, which may act as a barrier; but the amœbæ may penetrate into the intermuscular septa and reach the serous coat, where the same process goes on as in the submucosa, and perforation may follow. The ulcers vary in shape and size, and the floor may be the submucosa, the muscularis, or the serous coat, according to the stage of the disease. Often the aperture in the mucous membrane is small compared with the loss of tissue beneath, and frequently an opening no larger than a pin's head leads to a large sized cavity beneath. The cavities may communicate with one another by tortuous sinuses, thus undermining the mucous membrane over an extensive area and fairly riddling the bowel. The mucous membrane seems to suffer the least, and its lesions seem to be secondary to the changes in the submucosa. The process is one of advancing infiltration and softening of the submucosa and intermuscular tissue with following necrosis of the overlying tissue. Owing to the presence of the pyogenic organisms, suppuration is present to a greater or less degree, and should it gain the ascendancy, the typical amœbic ulcer becomes an ordinary suppurating one. The ulceration varies in rapidity and extent; in the grave and gangrenous cases it rapidly involves the whole or greater part of the colon, and death is due to the intensity of the lesion. In the chronic cases, the ulceration spreads apparently more slowly and is of limited extent; but at any time it may pass into the gangrenous form, and the tendency to extend is ever present.

From this brief consideration of the intestinal lesions, one readily perceives that the ulceration is peculiarly destructive, and is characterized by the constant tendency to increase.

The treatment of these chronic cases of amœbic dysentery is directed solely to the healing of the ulceration of the colon, and the same principles apply here as in the treatment of ulcerations on the surface of the body. The difficulties, however, are increased in these cases owing to the situation of the ulcers, as well as to their serious nature. The two conditions which

are requisite for success are cleanliness and an enforced rest of the ulcerated tissues; and it is only by fully meeting these requirements that we can hope for a cure. In their efforts to bring about a cure, the physicians rely mainly upon frequent irrigation of the colon with various stimulating, antiseptic, or astringent solutions. By these means they empty the bowel of its contents, and they also expect to keep the ulcers clean and to destroy the amœbæ and the various micro-organisms which swarm in the large intestine. When the ulceration is of limited extent and readily accessible, no doubt the treatment may be successful; but in the large majority of cases no permanent success can be hoped for until we obtain an enforced rest of the diseased bowel. It is only by placing the colon at rest that we are able to change the sloughing, suppurating surfaces of the ulcers into healthy granulation tissue, and that we restore the surrounding unhealthy tissues to their natural condition, so that the process of repair can be carried on. By forming a complete artificial anus through an inguinal colostomy, preferably on the right side, we can put the colon at rest, and through the bowel-opening we can, in addition, carry on a thorough and satisfactory local treatment of the colonic ulceration.

This is the method of treatment I would advocate for these chronic cases of amœbic dysentery which fail to respond to medical treatment. The operation should be performed early in the disease, and after the physician has had a reasonable length of time to demonstrate the failure of his treatment. The duration of uncomplicated cases, which are cured by medical treatment, varies from two to four to six months; and I would recommend that if, after four months of medical treatment, the dysentery is not cured, then the case should be turned over to the surgeon. The artificial anus should be left open for a long time, several months perhaps, and its subsequent closure should not follow until it is quite certain that the ulceration is healed. To ascertain this fact, we can, by means of the long rectal tube of Kelly, inspect the rectum, the lower sigmoid, and, by introducing the tube through the wound into the



ascending colon, we can make sure of this portion up to the hepatic flexure. As to the condition of the remaining portion of the colon, an approximate idea can be obtained after examining the irrigating fluid for the presence of the amœbæ and mucus. When by means of the tube the accessible portions of the colon are found free from ulceration, and the examination of the irrigations for several weeks are negative as regards the presence of the amœbæ, then we can restore the continuity of the gut. The annoyance of an artificial anus and the dangers attending its subsequent closure may be urged against this method of treating these chronic cases of amœbic dysentery; but it seems to me they are not to be compared to the result we hope to obtain in these otherwise hopeless cases. Should, however, the mesentery of the ascending colon be too short to allow of the formation of a complete artificial anus, or if it is evident that the ascending colon is ulcerated, then we may proceed higher up and perform the operation on the ileum. An ileostomy would serve as well, and the subsequent closure would be easier and less dangerous. This method of treating amœbic dysentery, when performed at any early date and after the failure of medical measures, and when followed up by a persevering and thorough local treatment of the ulcers of the colon, holds out a good prospect of cure, and, in view of the present want of success of medical treatment, is worthy of trial.

The treatment of inflammation and ulceration of the large bowel by colostomy is not of recent date, and it has been advocated and carried out successfully for several years. Many cases of ulceration of the sigmoid and rectum have been cured by this means, and several cases of membranous colitis successfully treated by colostomy have been reported by English surgeons. Colostomy has been suggested, also, in cases of chronic dysentery, but so far it does not appear to have been put into practice. Some two years ago I performed a right inguinal colostomy in a case of amœbic dysentery, the history of which may be of interest.

H. A., twenty-nine years of age, tailor, was admitted, August 8, 1898, to the New York Hospital.

During the summer of 1896 the patient began to be troubled with diarrhœa, averaging five to ten stools daily, containing blood and mucus, and accompanied with abdominal pain and tenesmus. He was treated at the Mt. Sinai Hospital by rectal irrigations with temporary relief; and in January, 1897, at the same hospital, he was operated on for hæmorrhoids with a view of curing the diarrhœa, which had steadily continued. During November and December of the same year he was under treatment at the Johns Hopkins Hospital. During the first six weeks of his stay there, daily rectal irrigations with quinine solution were used, but with no success. The irrigations with a silver nitrate solution were tried, but with no better result. In January, 1898, patient entered the medical wards of the New York Hospital, where he remained until early in May. Up to April his treatment was daily rectal irrigations with silver nitrate solution, one grain to the ounce, three quarts used at a time. During April this solution was used alternately with a 1 to 5000 quinine solution. When discharged in May, the diarrhœa had almost ceased and the stools contained no blood, pus, or amœbæ. In August, when patient entered my service at the New York Hospital, the diarrhœa had again returned, six to eight stools daily, abdominal pain and tenesmus at times very severe. He was somewhat emaciated, complained of weakness, and had lost forty pounds since the beginning of his illness. Abdomen rather retracted and rigid; painful on pressure over the transverse and descending colon. Examination of rectum with speculum revealed numberless ulcers of small size extending up as far as one could see. Several large ulcers could be seen, and the mucous membrane was inflamed, thickened, and covered with mucus.

Stools contained mucus, pus, and blood, and on microscopic examination large numbers of amœbæ were seen.

On August 12, the first step of a right inguinal colostomy was performed,—a small portion of the colon left protruding through the wound. August 14 the colostomy was completed, and the bowel opened by a one-inch transverse incision. On the following day irrigation of the colon was commenced, the bowel first being cleansed with a dilute Thiersch solution and thoroughly flushed with two to three quarts of a 1 to 5000 quinine solution.

This solution was used daily for two weeks, during which time the stools became less frequent, but amœbæ were always present. Then a 1 to 500 silver nitrate solution was substituted and used daily for two weeks, with no results as regards frequency of stools, but the amœbæ were less in number. During the following two months, *i.e.*, from September 15 to December 17, various solutions were used for irrigation: methyl-blue 1 to 2000, formaldehyde 1 to 10,000 up to 1 to 7500, silver nitrate 1 to 250, quinine 1 to 2000, and of the solutions tried, perhaps the silver nitrate one was the best. The stools during this period were mostly formed, at times they were loose, and the tenesmus and abdominal pains had disappeared. The amœbæ appeared at times, but in very small numbers; they were never absent over a period of two weeks. The formation of a complete artificial anus was then recommended, but the patient refused operation and left the hospital. Some six months afterwards I saw him, and found his condition very satisfactory. He had gained in weight and strength and was able to work at his trade. The colostomy wound was practically healed and secreted but a little mucus. He averaged two to three movements daily, generally formed, at times loose, but mucus was always present. Since then the patient has disappeared.

*Remarks.*—The result in this case, while not a cure, was fairly satisfactory in that for the first time in over two years the patient was improved enough to allow of his working at his trade. When last seen he had been working every day for several months with ease and comfort. When admitted to my service for treatment, it was found impossible to irrigate the colon from below, as it caused too much pain and suffering. Owing to this fact, I recommended a right inguinal colostomy for the purpose solely of enabling me to irrigate the bowel thoroughly from above, and with the patient's consent I made an incomplete artificial anus. This allowed of a thorough flushing of the colon, but after a time, owing to the amœbæ still being present in the stools, it was evident that the treatment was incomplete. For this reason I suggested that a complete artificial anus be made, thereby shutting off the fæcal circulation and placing the colon at rest. Had the suggestion

been accepted, the ulceration perhaps might have been healed; but it is doubtful, owing to the fact that the disease had existed for a long time and was very extensive.

The case illustrates well the fact that irrigation by itself, even when thoroughly carried out, is not sufficient for a cure. As in ulcerations elsewhere rest of the inflamed parts is a necessary requisite for successful treatment, so in amœbic dysentery, which represents the severest form of non-malignant ulceration of the bowel, not only must the colon be placed at rest, but the performance of the colostomy should be done at an early date.

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## SOME NEW POINTS IN TENDON SURGERY.<sup>1</sup>

By F. S. COOLIDGE, M.D.,

OF CHICAGO.

SEVENTEEN years ago Nicoladoni first published his account of transplantation of the tendon of a strong, healthy muscle into the tendon of a paralyzed muscle. His was a case of infantile paralysis in which the gastrocnemius and soleus muscles were completely involved, and in it he substituted for them the peroneal muscles, grafting their tendons into the tendo-Achillis. The idea of Nicoladoni met with but little success at the time, and even now there is not a great deal in American literature upon the subject. The *Transactions of the American Orthopædic Society* have but three papers on the subject,—one by Goldthwaite in 1895, another by him in 1896, and one by Vulpius in 1898. Morris, in "Orthopædic Surgery, 1898," devotes only a half page to the procedure of Nicoladoni in 1895. Milliken reports a somewhat similar case. But since 1898 enough cases have been reported, where this method has been used, to make the procedure a warrantable surgical fact. The Germans especially are loud in their praises of it.

At first it was used only in cases of infantile spinal paralysis when, in the lower limbs, certain groups of muscles were entirely paralyzed and certain other normal, or nearly normal, muscles were used to take their place, and this is still of great importance. In our present surgical light it is wrong to turn away these cases of infantile paralysis, telling them that massage and electricity are all that can be done for them, and recommending them to wear braces or shoes for the treatment of their deformities. This is being done too often in our large

<sup>1</sup> Read before the Chicago Surgical Society, January 4, 1901.

clinics to-day. In every case, a special study of the muscles involved must be made; and, if it is possible to transplant living tendons to replace the paralyzed ones, it should be done. It will be found that this helps in two ways,—first, the direct motion which the transplanted muscle gives to the joint, and, second, quite often the secondary muscles have been paralyzed simply by the being constantly overstretched by the strongly contracted opponent; and when this opponent is divided and the foot is brought into position their power is not slow in returning. For instance, in two cases of operation for complete talipes equinus with paralysis of the anterior tibial and peroneal muscles and strong contraction of the tendo-Achillis, in which the tendo-Achillis was divided, the foot brought into shape, and the living extensor proprius pollicis was transplanted into the tendon of the tibialis anticus, I was much surprised to find later that the peroneal muscles had regained their power.

There is yet another way in which this operation is of value, and that is when a foot is already drawn over by the unparalyzed muscles, the cutting of a strong muscle, to graft it upon its paralyzed opponent, would of course weaken the deforming power. For instance, in a case operated upon this week, and which is therefore not ready to be reported, in which the anterior tibial and extensor communis digitorum were powerless, and the posterior group with all the peroneal muscles had made an equino-valgus, the peroneus longus and brevis were cut off and transplanted into the anterior tibial tendon. The severing of the peroneal tendons would alone help the valgus, apart from the active motion which they will give to the anterior tibial.

There are several important points to be considered :

(1) The time of the operation. This should never be done until the reparative process which follows an attack of infantile paralysis has nearly or quite reached its limit. Massage and exercises are given, of course, until there is no further improvement. The operation should not be done until at least a couple of years after the attack; until it is definitely settled

which groups of muscles are wholly destroyed and which are not affected.

(2) The amount of strength of the muscle to be grafted as compared with the work it will be called upon to do. Much may be left to nature and the gradual strengthening of the muscle to meet the demands upon it, if we remember to keep the grafted muscle from being overstretched. Goldthwaite speaks of successfully making use of the peroneus tertius for the anterior tibial, and also that the sartorius, when grafted into the paralyzed quadriceps extensor, could hold the leg fully extended after a few months. Two or more weaker tendons can be used for an important function.

(3) The location of the grafting. The grafting of a normal muscle into the muscle substance of an uncut paralyzed one has not met with much success. The tendons offer a fitter field. The grafting may be done either above or below the annular ligament, preferably above it, because the annular ligament will then hold the tendon in its place. The tendo-Achillis has no annular ligament. Of course, it is easier to graft two adjacent tendons, but a tendon can be cut off and then carried by blunt dissection quite a distance, subfascially or subcutaneously, to be grafted wherever designed. Carl Beck tunnelled the interosseous ligament in grafting a posterior muscle into an anterior one. The result in this case is that the foot is held in fair position, but there is no independent motion of ultimate flexion and extension.

(4) The method of joining the tendons together. Straight end-to-end suture with the various knots has been tried as well as diagonal cutting of the tendons with suture; overlapping of the tendons after scarifying their sides has also been done. It is customary now, however, to pierce the normal tendon, to pull through the paralyzed tendon, and then apply sutures, according to Goldthwaite, or else cutting the paralyzed tendon quite long to fold it down and suture it to itself, first always taking a stitch at the bottom of the slit in the tendon, to prevent its splitting out to the end. These

latter methods give a securer hold. There should be a little tension employed at the time of grafting.

(5) Whether silk or catgut should be used depends upon the operator. Silk has occasionally caused trouble some time after the operation. Chromicized catgut with a life of from four to six weeks ought to answer every purpose.

(6) The postoperative treatment should be at least four weeks in a plaster bandage, and then massage and passive motion, usually with some appliance to keep the foot in its proper position for a couple of months more.

This same method of tendon grafting holds good in the arm, whether the cause of the deformity is infantile paralysis, cerebral paralysis, wounds lacerating certain muscles or severed nerves with no possibility of nerve suture.

In these cases the question of giving aid is a very serious one. On the one hand, we have certain groups of muscles totally paralyzed, on the other we have numerous perfectly healthy muscles, often more than one answering the same purpose; and at any rate there is always the possibility of splitting the healthy tendons into two and making use of one-half to graft upon a paralyzed tendon.

Tendon transplantation has proved to be a legitimate surgical measure. Its success frequently does away with the necessity of wearing braces, which are extremely irksome to the patients, and frequently corrects the existing deformity.

If it is called upon intelligently and with judgment, it will answer in the same strain. It will not do the impossible; it will not make the shortened limb grow longer, nor will it bestow power to completely paralyzed muscles; but it will enable the surgeon to apply whatever power there is left in the most valuable way possible.

I must preface the second part of this paper by stating what is already known about tenotomy in cerebral spastic paralysis. There are all degrees of paralysis following brain lesions in children, from a slight hemiplegia, which may entirely disappear of itself, to complete involvement of all the muscles with gibbering idiocy. The essential point in all cases,



however, is the spastic condition of the muscles involved. The reflex centres are so active that the patient, in trying to use one muscle, excites the neighboring centres of the other muscles so that all the muscles contract at the same time, which, of course, precludes any certainty of action. The muscles involved being constantly contracted pull the member over to their side, thus creating a deformity which ultimately may become fixed by their contracture. But for a long time a firm, steady, manual pull, without any jerks, so as not to excite the reflex centre anew, will overcome the deformity, which, however, returns the moment the pull is relaxed.

The mental effects vary considerably in these cases, and apparently with no definite rules. Sometimes with a slight spastic element the mental condition is decidedly below par, and epilepsy develops as the child grows. At other times both lower limbs are seriously spastic, with but few mental symptoms.

It is well understood at present that a tenotomy of a spastic muscle causes the spasm to disappear. No good reason for this has ever been offered. It is simply a fact. Overcoming the deformity and holding the limbs straight in plaster of Paris for a couple of months at a time does no good at all, as the spasm of the muscles immediately returns; but tenotomy of the muscles does away with the spasm. For this reason it is quite customary to tenotomize the tendo-Achillis for a spastic posterior group, and I have never seen the spasm return. When cut, the proximal portion of the tendon springs back from one and one-half to two inches, leaving a wide gap, but it unites readily and securely.

Some surgeons claim that frequently the spastic condition of the muscles of the thigh grow better after a simple tenotomy of the Achilles tendon, but I have not seen this.

When the spastic paralysis extends higher up, involving the muscles of the pelvis and thigh, the patient is unable to walk; the adductors cause the knees to hug each other, the knees to flex, and the feet to be extended, and they are indeed in a pitiable condition. No single definite motion can be made.

In this condition, tenotomy of the adductors and of the internal and external hamstrings can be done to do away with the spasm, and then the patient can be taught to use the muscles independently and to walk. In a few of these cases there is a tendency towards a return of the spastic condition. The operation is the first, but important, step of the treatment, which should consist of electricity and massage and teaching the patient the use of his limbs.

It was in a case of this kind in which the constant contraction of all the muscles had elevated their bellies an inch or more, making the tendons longer by that amount, that I noticed the high location of the belly of the quadriceps extensor.

There was no muscle close to the patella, but a well defined ligament, one and one-half inches long, between the patella and the muscle. It showed that the quadriceps extensor was spastic as well as the rest of the muscles, which is quite generally the case. If the rule that "tenotomy cures spasm" holds good for the rest of the muscles, why not for this muscle too? But the ligament might not unite if it were cut, so that I decided to lengthen it.

CASE I.—Operation, April 28, 1896. T. J., male, five years old. Spastic paraplegia involving all the muscles of both legs. Knees are locked by adduction, slight impairment of mentality. Has never been able to walk or even stand alone. Chloroform. Tenotomy of both tendo-Achillis, both adductor groups at the perineum; open incision and tenotomy of both left and right internal and external hamstrings. A three-inch incision over the centre of the right quadriceps extensor tendon down to patella. A slit one and a quarter inches long was made longitudinally in the centre of the tendon, and the knife was then carried into the ends of this slit from opposite sides. The ends were slipped apart and the two larger ones were united with catgut sutures. The other side was left untouched for the purpose of comparison. Wound closed without drainage and plaster applied six weeks after.

June 9, same year, my notes read: Attempts at walking

are greatly improved: can now place one foot in front of the other unsteadily but still with accuracy. The right leg shows much less spasm, and is better under control than the left. Right knee can be flexed to a right angle before spasm catches it. The left knee cannot be flexed half that amount. The right extensors seem a little weaker than the left, but have plenty of strength; union of all severed tendons is firm.

As the patient changed his residence, I was unable to get a later report of this case. The immediate result of the operation showed that the spasm of the quadriceps extensor was relieved.

CASE II.—G. S., male, twenty years of age. While not a case of central paralysis, it was a case of spastic paralysis of marked severity. On October 2, 1896, he fell from a freight-car and struck his back on an engine. He was completely paralyzed at once, but in a week feeling and power returned to his arms and upper part of his body. In a year there was slight movements in the legs, which, however, had contracted "as far as possible," he says. At this time tenotomy of the hamstrings was done, and the legs were straightened one-half. Bedsores developed, which were slow in healing. When I first saw him in October, 1899, sensation had returned to his legs, but the spasm was so great that he could make no definite movements with them. The legs would be drawn up to his body involuntarily, and he would have to place them down again with his hands. They were contracted at one-half of a right angle. The feet were distorted. There was some bladder paralysis. He was using an invalid's chair. I told him that I would promise him nothing but an experiment, and he consented only too gladly, the chair-life he was leading was too unendurable. I expected to have to cut the psoas and iliacus to overcome the spasm which pulled so violently upon his legs, but decided to cut the quadriceps extensor tendon and to watch the result.

First operation, October, 1899, right leg; tenotomy of adductors, of internal and external hamstring, and cutting the tensor vaginae femoris through an oblique incision four inches long, brought the leg firmly well down. I then lengthened the quadriceps extensor as previously described.

He rallied well from ether. We were both much surprised to find that the leg was not pulled up at all after the plaster cast was taken off. The improvement was so great that in December

we operated the same way on the other leg; and in addition I was just going to do a tenotomy of the tendo-Achillis, and was putting a little manual force on the foot when the bone broke just above the ankle. It was degenerated by trophic nerve disturbance and made an impacted fracture, but as it was in the right direction I increased the mashing a little and brought the foot into good position. The next three days the patient suffered considerably with a rapid, thin pulse, perspiration, and was more or less collapsed, which I took to be from fatty embolism from the fracture. He rapidly recovered, and was none the worse after it. When the plaster was off this time the legs were nearly straight, did not yield to the spasm, and he could use them to make definite motions. In January I got him a pair of crutches, and had the attendant spend five minutes with him morning and night. I felt that the slight contractures of the thigh and of the unfractured foot could be overcome by walking with the crutches. In February he left the hospital, and on April 30 I received this letter. "Two weeks after I left the hospital I got a new pair of crutches, one and three-quarters inches longer than the others" (showing that he had straightened out considerably), "and I walked about 150 feet alone three or four times a day, and of course I did not walk perfect, as I stumbled every now and then, but I had improved considerable since I left the hospital. My bladder is in pretty good shape. In regard to my feet, one of them is all right, and the other is coming around slow."

In this case, at any rate, the experiment proved successful, putting upon his feet a man otherwise doomed to a miserable chair-life.

# SOME ERRORS IN DIAGNOSIS IN CONDITIONS RESEMBLING APPENDICITIS.<sup>1</sup>

BY GEORGE EMERSON BREWER, M.D.,

OF NEW YORK,

JUNIOR SURGEON TO ROOSEVELT HOSPITAL; ATTENDING SURGEON, CITY HOSPITAL; INSTRUCTOR IN SURGERY, COLLEGE OF PHYSICIANS AND SURGEONS.

ALL who are accustomed to deal surgically with intra-abdominal inflammations appreciate the frequency with which errors in diagnosis are made. I think all will agree that in the majority of instances these errors have been in mistaking atypical forms of appendicitis for other conditions. At any rate, most of the communications which have recently been made on this subject have dealt with errors of this kind, and much thereby has been added to our knowledge of the differential diagnosis in conditions resembling appendicitis, particularly with reference to inflammatory diseases of the female pelvic organs and of the gall-bladder.

As we frequently learn more from a careful consideration of our errors than from a study of the cases in which our diagnosis is found to be correct, I have decided to present for your consideration this evening a series of instructive mistakes.

During the past eighteen months the writer has, on eleven occasions, made the mistake of regarding as appendicitis conditions which, upon operation or autopsy, have been shown to be other and unsuspected pathological processes. As a study of these cases has proved far more instructive to the writer than the much larger number of fairly typical cases observed

<sup>1</sup> Read before the New York Surgical Society, December 26, 1900.

during this period, and, as some of the conditions encountered are comparatively rare, the cases will be briefly reported, in the hope of gleaning from the discussion certain facts which may enable us to avoid such errors in the future.

The cases may be classified as follows: in two the symptoms were found to be due to renal calculus; in four, to diseases of the uterine appendages; in one, to sarcoma ileum; in one to cholecystitis; in one, to acute suppurative pancreatitis, and in two, to general sepsis.

With the exception of the two renal cases, all were observed by the writer during practically the entire course of the illness. Six were operated upon during a supposed acute attack of appendicitis; four were kept under observation until the acute attack had subsided and were operated upon during the interval; while in one, a fulminating case, no operation was performed, the condition being determined by autopsy.

CASE I.—A. B., aged twenty-one. Native of Bermuda. Family and previous personal history negative. In the autumn of 1899, he experienced sudden attacks of acute abdominal pain, generally referred to the right lumbar and iliac regions. These attacks at times would be of short duration, occasioning him but temporary inconvenience, at other times they would last for days and be accompanied by nausea, vomiting, and local tenderness. He was examined by a competent surgeon at his home, who, after observation of the symptoms, made the diagnosis of renal calculus and proposed an exploratory operation. Early in 1900 this was done; the kidney exposed, thoroughly palpated, pronounced in normal condition, replaced, and the wound closed.

Complete relief for a period of several weeks followed the operation. After quitting the hospital, however, the symptoms returned, and after unsuccessful medical treatment for a short period he came to New York and entered the Roosevelt Hospital. At this time the pain was almost constantly present, and it was located just above and to the inner side of McBurney's point. It was characterized by acute exacerbations, when vomiting would occur. There was no vesical irritation. The temperature and pulse were normal. Urine clear, acid, no albumen, sugar. pus. or blood.

Examination of abdomen showed no muscular rigidity, no tumor, no distention. An area of acute tenderness, about one inch above and to the inner side of McBurney's point, was noted. Kidneys not palpable. Gall-bladder region free from evidences of disease. Rectal examination negative.

The negative result of the renal exploration, the location of the pain and tenderness, together with the vomiting, led to a diagnosis of chronic appendicitis, with the probable presence of a concretion. Intermuscular operation early in June. Appendix found acutely flexed, but apparently normal in other respects. Gall-bladder and kidney region palpated, with negative result. Wound closed. Immediate relief followed, and the patient left the hospital in two weeks.

A few weeks later he again returned, suffering more than ever, this time referring the pain to a point one inch to the right of the umbilicus. The pain was continuous, but was increased at intervals. The vomiting occurred several times a day and was very exhausting, the violent retching lasting often for several hours. No bladder irritability, no tenderness over the kidney region. The urine at this time contained a few red blood-cells, but was otherwise normal. A cystoscopic examination was then undertaken and an attempt made to catheterize the right ureter, which failed. The cystoscopic examination was negative. A few days later, under chloroform anæsthesia, the kidney and upper third of the ureter were exposed by a lumbar incision, and a calculus found at the junction of the pelvis and ureter. This was removed through a small incision and the wound in the ureter united with silk. Primary union, excepting for the drainage opening. No urinary leakage. Complete relief followed. The patient left the hospital in about four weeks. A letter recently received reports him in perfect health.

CASE II.—A. V., a girl aged thirteen. Ever since early childhood, patient has complained of abdominal pain, located chiefly in the right side. This was occasionally accompanied by fever and general malaise. The pain was paroxysmal, occurring at long intervals at first. Later, the attacks became more frequent, and were accompanied by vomiting. For a period of about one year the attacks occurred nearly every day. Two years ago she was admitted to the Roosevelt Hospital and her appendix removed. Six months later, there being no improvement,

the abdomen was again opened and the gall-bladder region explored, with negative result. Two weeks later the right kidney was exposed and anchored to the quadratus muscle. A certain measure of relief followed this operation, although albumen, pus, and casts appeared in the urine, and have since remained. She left the hospital on February 22, was re-admitted on March 4, with a return of the same symptoms. She was kept under observation for several weeks, during which the attacks of pain would occur at intervals of six to twenty days. During the attacks there would be a moderate elevation of temperature, nausea, and vomiting; tenderness over the right side of the abdomen and flank; no muscular rigidity. These attacks would continue for four or five days. Urine, cloudy; specific gravity, 1026; 1 per cent. albumen; free pus and casts.

On June 11, under chloroform, the bladder was examined with a Pryor cystoscope and the right ureter catheterized. Examination of the urine, from the right ureter, showed 10 per cent. albumen and a very large amount of pus, with a few red blood-cells and casts.

On July 13, the kidney was exposed by a lumbar incision and palpated. Nothing abnormal was felt. A cortical incision into the pelvis was then made, and a calculus the size of a small bean was found and removed. The renal wound was packed and the lumbar wound partly sutured. Recovery uneventful. No return of pain. On her discharge from the hospital, the urine contained but a trace of albumen and a small amount of pus.

CASE III.—R. W., aged sixty, was admitted to the service of Dr. Lilienthal, at Mount Sinai Hospital, at midnight, early in January last, suffering from acute abdominal pain, nausea, general tenderness, muscular rigidity, vomiting, fever, and a rapid, feeble pulse. There was a history of several previous attacks. The onset was that of an acute appendicitis, pain in the right iliac region, nausea, and moderate fever for three or four days. The symptoms had then increased rapidly in severity and were thought to be due to a perforation, with beginning general peritonitis. On examination, the abdomen was found to be moderately distended. General muscular rigidity was found, but more marked on the right side. Rectal examination, rigidity, and tenderness on the right side, but no mass. Under chloroform, a large mass was felt to the right of the median line, just above the pubis.



Incision along the right border of the rectus muscle. When the peritoneum was opened, a moderate amount of free fluid escaped; a large black, almost gangrenous cyst was found attached to the right broad ligament by a pedicle, which was twisted two and a half times to the right. This was easily removed, the abdomen closed with a cigarette drain. Recovery uneventful.

CASE IV.—In May last I was called to see J. W., a young woman, aged twenty-four, who for three days had been suffering from right-sided abdominal pain, nausea, fever, and general malaise. Two years ago she had a similar attack, which kept her in bed for two or three weeks, the diagnosis at that time being acute appendicitis.

On examination, the abdomen was found to be slightly distended, with marked muscular rigidity and tenderness in the right iliac region. There was exquisite tenderness over McBurney's point. No mass could be felt. Vaginal examination negative. Urine negative. There was no history of menstrual irregularity, or of inflammatory disease of the pelvic organs. Pulse, 100; temperature, 101° F. She was admitted to the Private Patient Pavilion of Roosevelt Hospital, a cathartic given, and an ice-bag applied to the right inguinal region.

The following day the pain was relieved, after which the temperature promptly fell to normal. She was discharged at the end of a week, with the understanding that she was to return in two weeks for an interval operation. Abdominal examination at this time was negative, excepting for a slight tenderness in the appendix region.

She returned to the hospital in about eight days, suffering from another acute attack, and was seen by my colleague, Dr. Blake. The temperature and pulse at that time were elevated, the pain severe, the tenderness general. The question of an immediate operation was seriously considered, as the symptoms seemed to indicate a more acute process than in the last attack. The same treatment was pursued as in the former instance, and at the end of thirty-six hours a decided amelioration was noted. The improvement continued, and at the end of nine days the temperature had fallen to normal, the pain had subsided, and the muscular rigidity had disappeared.

On June 2, under chloroform anæsthesia, an ovoid tumor

was felt, which was distinctly movable, and the possibility of a strangulated ovarian cyst was considered. The abdomen was opened by the intermuscular method and a cyst was found, about three inches in diameter, attached by a short pedicle to the omentum. This was removed. The right Fallopian tube and ovary were then drawn into the wound and three or four minute cysts were discovered, each attached by a long pedicle to the broad ligament, immediately above the ovary. On close inspection, a ruptured pedicle was found, arising from the same region, which had doubtless been the stem of the larger cyst, which, after spontaneous separation by torsion, had probably become attached by inflammatory adhesions to the omentum. After removal of the smaller cysts, the abdomen was closed. Recovery was uneventful.

CASE V.—H. H., female, aged thirty-six, was sent to the Roosevelt Hospital with a diagnosis of acute appendicitis. On admission, the temperature was  $101.4^{\circ}$  F.; pulse, 112. She complained of severe pain in the right inguinal region, with nausea, vomiting, and rigidity of the right half of the abdominal wall. Bowels free. By vaginal examination, tenderness, but no mass was felt in the right half of the pelvis. Urine negative.

The following day she was much more comfortable, and it was decided to wait until the interval for an intermuscular operation. The attack quickly subsided, and she was discharged at her own request. Ten days later she was re-admitted, giving a history of constant pain since resuming her household duties. At the end of three or four days the pain had become localized and so severe as to necessitate her going to bed. On admission, marked tenderness existed, and what was thought to be a thickened appendix could be palpated in the right iliac region. Moderate muscular spasm. Temperature,  $98.6^{\circ}$  F.; pulse, 90. Vaginal examination negative. Under chloroform anaesthesia, the abdomen was opened over the appendix region. An apparently healthy appendix was found, and not disturbed. In examining the pelvic viscera, an oblong, thin-walled, translucent cyst was found attached to the uterus and right pelvic wall, which, upon close inspection, was found to be a very much dilated Fallopian tube. This was apparently twisted at its uterine extremity. The cyst and ovary were removed, the abdomen closed, and the patient placed in bed. The convalescence was normal.

CASE VI was that of a young married woman, about thirty years of age, who had experienced a severe attack of general abdominal pain, accompanied by high fever, vomiting, and nausea, with tenderness over the lower right side. Duration, twenty-four hours. This was diagnosticated appendicitis by her attending physician, who sent her to the Roosevelt Hospital. On admission, it was evident that the attack was subsiding, and it was thought best to postpone operation until the interval.

The temperature on admission was 100° F.; pulse, 116. Examination revealed marked tenderness in the ileocæcal region, with a moderate spasm of the lower half of the right rectus muscle. Vaginal examination revealed only slight tenderness of the pelvic roof, uterus movable, no induration. The absence of any pelvic disease was also verified by a member of the gynæcological staff of the hospital. There was, however, a history of vaginal discharge.

Treatment: rest in bed, a mild cathartic, and an ice-bag to appendix region. After two or three days the muscular rigidity disappeared, and it was thought that a slightly tender appendix could be palpated.

About five days after her admission there occurred a sudden rise in temperature to 104.2° F., with a corresponding elevation of the pulse. This was accomplished by a reappearance of the pain, with more or less general abdominal tenderness, slight muscular rigidity, and distention. These symptoms rapidly increased in severity, and she soon presented the appearance of grave illness. Examination of the chest was negative. Urine negative. There was a well-marked leucocytosis.

She was immediately prepared for operation, the supposition being that a perforation of the appendix had occurred or the rupture of an abscess, with a resulting general peritonitis. On opening the abdomen, no evidence of inflammation was found. The appendix was absolutely normal in appearance, and presented no evidence of previous inflammation. The region of the gall-bladder and right kidney were examined, also the pelvic viscera, but nothing was found to account for the symptoms. The abdomen was closed with a small drain of gauze. Her symptoms were apparently not influenced by the operation. She continued to complain of general abdominal pain, and had a high continued fever for several days, at the end of which well-marked signs of

a circumscribed pneumonia were discovered in the right lung. With this there continued some nausea, occasional vomiting, and a moderate amount of distention. The bowels were moved, however, without difficulty, and after four or five days the pain became localized on the left side, over the middle third of the descending colon. This soon disappeared with the fever and other symptoms, and in ten days she was thoroughly convalescent. After a week or more of entire freedom from pain and other symptoms, a gradual rise in temperature was again noted. This was accompanied by a feeling of discomfort in the left inguinal region, just above Poupart's ligament. A day or two later a small, tender mass was felt, which, by bimanual palpation, was found to be located high in the pelvic cavity. The symptoms not yielding to expectant treatment, two days later an exploratory laparotomy was made, an abscess found immediately beneath the anterior abdominal wall; but its relation to the uterus, or broad ligament, could not be determined without breaking down firm adhesions. After evacuating the pus, the cavity was swabbed with peroxide of hydrogen, a cigarette drain introduced, and the abdominal wall sutured. The convalescence was uneventful.

CASE VII.—A young woman, twenty-three years of age, single, was sent to the Roosevelt Hospital during an attack of acute abdominal pain. She gave a history of a sharp attack of colic two years before, situated in the right iliac region, which was not accompanied by vomiting, fever, or constipation, and which did not necessitate her remaining in bed. Similar attacks were experienced every two or three weeks for a year or more, in which the pain was always localized in the right iliac region. These attacks were of short duration and occasioned her but slight inconvenience. One year ago she had a severe attack which was accompanied by vomiting, and necessitated her remaining in bed for several days. Between these attacks there was always a certain amount of soreness in the right iliac region, which was especially marked on exertion. On June 15 she experienced a very acute attack of pain in the region of the appendix, which was accompanied with fever, chills, and persistent vomiting. The symptoms gradually increased in severity for six days, when she was admitted to the hospital. On admission, her pulse was 100; temperature, 99.8° F. Complaints of moderate pain and frequent

vomiting. On examination, tenderness and muscular rigidity were noted over the entire right half of the abdomen. The tenderness, however, was more marked over McBurney's point. No tumor was found. The urine was cloudy; specific gravity, 1036; acid. No albumen, sugar, pus, or blood.

As she was apparently convalescent from the attack, and as her menstruation appeared, operation was postponed for several days. During this period the abdomen was frequently palpated and the tenderness generally felt low down, which, with the character of the previous attacks, and absence of jaundice and gall-bladder tumor, led us to regard the condition as one of chronic relapsing appendicitis. Under chloroform anæsthesia, nothing abnormal could be felt in any part of the abdomen.

The appendix was exposed by a small intermuscular incision and found to be normal. The gall-bladder was next examined and found to bear the evidences of recent inflammation. It was opened, and twenty-seven large and small stones found and removed. There was a moderate inflammatory thickening of the walls. The viscus was attached to the abdominal wall by three or four catgut sutures and drained by means of a rubber drain-tube, introduced and fixed by three rows of purse-string sutures. The result was satisfactory, the wound healed kindly, and after removal of the tube there was practically no leakage.

CASE VIII.—E. G., male, aged fifty-three, was admitted to Roosevelt Hospital in August last. The patient had complained of a digestive disorder for many years. Seven years ago he experienced an attack of severe abdominal pain which was accompanied by fever and was regarded as an acute peritonitis. From this he fully recovered. Five days before his admission, he complained of general abdominal pain, which gradually increased and was accompanied by vomiting, fever, and general malaise. Free catharsis produced no relief. His symptoms grew worse. A progressive distention of the abdomen ensued. He had sweats, and became extremely weak and prostrated. On admission his temperature was 104.2° F.; pulse, 100, but weak and thready; respiration, 36 and shallow. The abdomen was greatly distended, tenderness was everywhere present. No mass, no jaundice, no fluid wave, liver percussion normal. Heart and lungs negative. Rectal examination negative. Urine negative. Bowels constipated.

He was seen by the writer about midnight, and, as his condition seemed extremely critical, he was immediately prepared for operation.

As the clinical picture was one of a general peritonitis, the absence of signs of gall-bladder disease, or the symptoms of a perforative lesion of other portions of the alimentary tract, led us to a diagnosis by exclusion of a perforated appendix.

Under chloroform anæsthesia, the abdomen was opened. There was no general peritonitis. The appendix region was thoroughly explored and found to be normal. The gall-bladder region was next examined and nothing of an inflammatory nature detected. As the intestines were greatly distended, an obstruction was looked for, but not found. All of this was done quickly, as the pulse was becoming rapidly weaker, and the most vigorous stimulation was being employed, including a hot saline infusion.

The region of the pancreas was next palpated, through the walls of the stomach and omental tissue, and pronounced negative by two examiners. There was, however, noticed a large number of small white spots, generally distributed throughout the greater omentum, the largest being about one-sixteenth of an inch in diameter. One of these was removed for examination, after which the abdomen was quickly closed, with generous gauze drainage.

The patient did not rally and died the following day. A report received from the hospital pathologist stated that the small white nodule was of the nature of a fat necrosis, and the autopsy revealed the pancreas to be the seat of a number of small circumscribed abscesses. The case was, therefore, one of acute suppurative pancreatitis.

CASE IX.—A man, aged forty-two, was admitted to the service of Dr. Lilienthal, at Mount Sinai Hospital, in January last, suffering severe abdominal pain. He stated that up to fourteen days before admission he had been apparently well. He then noticed an acute pain in the lower abdomen, with tenderness over the right iliac region. This pain increased in severity, was accompanied by fever, nausea, vesical irritability, and general weakness, necessitating his giving up his work and going to bed. On admission his temperature was 101.4° F.; pulse, 98. The abdomen was flat. There was perhaps a slight muscular rigidity

present in the lower right quadrant, and on palpation a large tender mass, about the size of an infant's head, could be distinctly felt, occupying a position in the right iliac and hypogastric regions, and extending beyond the median line to the left. This was not movable, and gave the impression of fluid surrounded by thick, dense walls. By rectal examination, the mass was felt, occupying nearly the entire pelvic cavity, and very tender. The bowels were free. There was no jaundice. Urine pale, acid; specific gravity, 1026; albumen, and casts. A hasty examination of the blood revealed a marked leucocytosis. Supposing that we had to do with a large appendicular abscess, he was immediately prepared for operation. Under chloroform anæsthesia, the abdomen was opened by a large incision situated just to the right of the median line. This exposed at once an enormous tumor, growing from the small intestine, which almost entirely filled the pelvic cavity and extended upward half-way to the umbilicus. It was adherent to the parietal peritoneum of the abdominal and pelvic walls, to the cæcum, ileum, appendix, sigmoid, rectum, and bladder. Severe hæmorrhage followed the separation of these adhesions. The tumor, together with about six inches of small intestine, was removed, and the intestinal tube united by a Murphy button. The tumor was soft, and during the manipulations was ruptured, allowing a certain amount of granular detritus—from a softened area situated in its centre—to fall into the pelvic cavity. This was removed, but, as there was no reason to regard this material to be other than sterile, as it apparently came from the centre of a solid tumor, great care was not exercised in subsequent disinfection. The patient left the table in good condition.

For three days the pulse and temperature remained below 100. There was, however, more or less constant vomiting and a progressive asthenia. He died without further elevation of the temperature or pulse, and without abdominal distention. Autopsy showed a localized peritonitis. Examination of the tumor revealed the fact that it was a soft sarcoma growing from the intestinal wall, and that there was a minute perforation of the mucous membrane, which conveyed infection to the centre of the mass, thus accounting for the leucocytosis, and also for the peritoneal infection.

CASE X.—A young man, aged twenty, was admitted to the

service of Dr. Lilienthal, of the Mount Sinai Hospital, in January, 1900, with a diagnosis of general peritonitis. He stated that until four days before he had been perfectly well. He then had experienced severe paroxysmal pain in the abdomen, which he later referred to the right lower quadrant. He became weak and faint and was obliged to remain in bed. There had been no vomiting. During the last twenty-four hours the symptoms had changed. The pain had, in large measure, disappeared, but the abdomen had enlarged and become exquisitely tender, and was hard. Temperature on entrance, 102° F.; pulse, 108. A hasty blood examination showed a marked leucocytosis.

The abdomen was greatly distended and of a board-like rigidity, which practically prevented any satisfactory palpation. Tenderness was, however, everywhere present. The respiration was shallow. The countenance expressed grave illness. The diagnosis of a general peritonitis following a perforative appendicitis was concurred in by all present, and an operation immediately undertaken. On opening the peritoneal cavity, with the exception of a very slight congestion of the vessels of the bowels and a well-marked distention, nothing abnormal was seen. The appendix was normal, the region of the gall-bladder, kidney, spleen, and stomach were free from adhesions or other abnormalities. Several very much enlarged lymph glands were, however, found on the right side of the pelvis, along the course of the internal iliac vessels.

The abdomen was closed with a small cigarette drain, after which a rectal examination was made. This revealed evidences of an acute follicular prostatitis, with a chain of enlarged glands leading upward from the prostate. From the urethra was expressed an abundant purulent discharge containing gonococci.

The course of the disease was apparently not modified by the operation, the fever and abdominal symptoms continuing for several days. Under urethral irrigation and local measures addressed to the prostatitis, however, the conditions began to improve, the abdominal symptoms diminishing first, the other evidences of sepsis later. He was discharged well in about three weeks.

CASE XI.—In February, 1899, I was called to see H. O., male, aged twenty-four years, who was convalescent from a lobar



pneumonia. He had been critically ill for about two weeks, but for the past five or six days had been free from temperature, and was thought to be rapidly recovering.

A few hours before he was seen by the writer, he had complained of pain in the right inguinal region, had experienced slight nausea, and was generally ill. His temperature was 100° F., pulse something over 100. An examination of the abdomen revealed only a slight muscular spasm over the ileocæcal region and marked tenderness. As he had had several sharp attacks of supposed appendicitis during the past four or five years, and the question of the removal of the appendix had been seriously considered, a diagnosis of appendicitis was at once communicated to his friends; but, owing to his condition, only expectant treatment advised.

In a few hours the temperature had risen to 103° F., and the pulse to 120. There was well-marked muscular rigidity over the entire right half of the abdomen. The patient was mildly delirious. At the suggestion of his attending physician, Dr. Evan Evans, Dr. Janeway was called in consultation. When seen by Dr. Janeway his temperature had risen to 104°, and tenderness was present over the entire abdomen, but was more acute over the region of the gall-bladder. The diagnosis of a rapidly spreading peritonitis was concurred in by all, but whether due to appendix or gall-bladder was not clear. In view of his condition, no operative interference was deemed advisable.

The following morning, he was seen in consultation by Dr. W. T. Bull. At that time he presented every symptom and sign of a septic general peritonitis. Temperature, 105° F.; pulse, 140. The abdomen was greatly distended and of board-like rigidity. Tenderness was everywhere present. The patient was delirious. The urine was scanty and albuminous.

Examination of the lungs revealed only the evidences of a resolving pneumonia. His condition precluded any idea of an operation. His symptoms gradually grew worse. The temperature rose to 106°, the pulse to 160. His delirium deepened into coma, and he died the following night. It was noted that for several hours before his death the abdominal distention and muscular rigidity had entirely disappeared.

On autopsy, the abdomen was found to be entirely free from the evidences of inflammation. There was a resolving pneu-

monia of the lower lobe of the right lung, a meningeal congestion, and other evidences of a severe general sepsis.

Cultures made from the blood taken from the right heart and spleen showed a pure culture of the pneumococcus, which, as a result of animal inoculations, was found to be of extreme virulence.

In this case, we evidently had to do with a primary pneumococcus infection of the lung, after the subsidence of which a new infection occurred; this time the blood being the culture medium, a pneumococcus septicæmia.

These cases present no new lessons. They, however, illustrate facts which are known to us all, but are often overlooked, and which may be briefly summarized as follows:

Cases I and II show that renal calculi may produce pain, simulating that produced by lesions of the appendix or the biliary passages, and are often unaccompanied by classical signs, such as hæmaturia, vesical irritation, and tenderness in the lumbar region. They prove, also, that even by inspection and palpation of a kidney, through a lumbar incision, small stones may occasionally be overlooked.

Cases III and IV illustrate the well-known fact that cysts of the right ovary or parovarium, when strangulated by a twisted pedicle, may often present symptoms which closely simulate an acute appendicitis.

Case V, that a twisted hydrosalpinx (certainly a rare condition) may simulate the same disease.

Case VII would seem to emphasize the well-known fact that cholecystitis and appendicitis are often extremely hard to differentiate.

Case VIII teaches that the negative results of palpation of the region of the pancreas, through the walls of the stomach or tissues of the omentum, by no means exclude an acute suppurative process in that organ; that the presence of small white areas of fat necrosis generally distributed over the peritoneal surfaces should immediately direct our attention to the pancreas, and also that the local condition, or the general sepsis caused by this lesion, may give rise to symptoms and

signs strongly simulating those produced by a general infection of the greater peritoneal sac.

Case IX illustrates the fact already emphasized by Libman that a rapidly growing sarcoma of the small intestine is often mistaken for acute appendicitis, and that in the early stage of their development these growths produce no obstruction, and often give rise to no discomfort.

Cases VI, X, and XI illustrate in a most striking manner that severe general sepsis, from infected foci entirely removed from the abdominal cavity, may often give rise to symptoms and signs identical with those produced by a local or general peritonitis.

# RARE COMPLICATIONS AFTER OPERATIONS FOR APPENDICITIS.<sup>1</sup>

By WILLY MEYER, M.D.,  
OF NEW YORK,

PROFESSOR OF SURGERY AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL  
AND HOSPITAL; SURGEON TO THE GERMAN AND TO THE NEW  
YORK SKIN AND CANCER HOSPITALS; CONSULTING  
SURGEON TO THE NEW YORK INFIRMARY.

IN view of the fact that every surgeon nowadays is frequently called upon for work in cases of appendicitis, a relation of rare complications arising after such operations which are done in the interval as well as the acute stage, may perhaps be of interest.

I refer to thrombosis of the right or left femoral vein after interval operations; and to acute intestinal obstruction following laparotomies on patients suffering from acute appendicitis complicated by localized or general peritonitis.

## I.—THROMBOSIS OF THE FEMORAL VEIN.

CASE I.—On December 13, 1897, late in the evening, I was called by a colleague to see a young woman of seventeen, who had been taken sick with symptoms clearly corresponding to those of acute appendicitis. Since childhood she had frequently complained of pain in the appendix region, and on one occasion she had been confined to her bed for over three weeks with alleged peritonitis. Since her menstrual periods began, four years ago, she suffered excruciating agony in almost every instance before the real flow set in. On the night I was called to see her in consultation, her menses were also approaching, a coincidence which made it extremely difficult to look clearly into the case. She had a pulse of 132; there was extreme tenderness in the

<sup>1</sup> Read before the New York Surgical Society, April 11, 1900.

region of the appendix, extending towards the left lower part of her abdomen; temperature,  $103.8^{\circ}$  F.; she had vomited repeatedly. There was no dulness on percussion, but marked general tympanitis. On examination per rectum, the whole region corresponding to the right iliac fossa, also to Douglas's sac, was very tender on pressure, but not resistant. Operation was done at 2 A.M. on December 14, at the patient's home. On entering the abdomen a small amount of slightly turbid serous fluid escaped. Following up the longitudinal band of the caput coli downward, the appendix could nowhere be detected. The region where it ought to have been was filled with a network of old, very firm, and dense peritoneal adhesions, spread between the caput coli, the neighboring small intestine and omentum and parietal peritoneum covering the iliac fossa. After a very careful search and with the help of strong artificial light, the appendix, extremely short, certainly not longer than one to one and a quarter inches, was at last found suspended in an old adhesion which formed a regular broad, transparent membrane, at least half the size of the palm of the hand. It was tobacco-pipe shaped, *i.e.*, its proximal end was slim and its distal portion distended; the part between the two ends, corresponding to the curve, seemed obliterated on examination from without. The surrounding adhesions were tied off, the appendix amputated, and the stump ligated after cauterization. The wound was closed by layer sutures except in its middle, where a gauze drain was carried down to the stump of the appendix. The removed organ showed symptoms of repeated inflammation, a few ecchymotic spots in the mucous membrane of the distended distal end. During the first seven days the patient made an uninterrupted recovery. She seemed to suffer a good deal of pain, which, however, improved after her menstruation set in on the third day after the operation. In the night from the eighth to the ninth day after the operation, her doctor was hurriedly called on account of excessive pain of the patient in her left groin. Nothing definitely could be made out on examination. The pulse was not accelerated, temperature not increased. At my visit the following morning my attention was called to the painful spot. I, too, failed to detect anything abnormal; but pain and general distress increased. Pulse and temperature also became slightly elevated, and two days later œdema around the left ankle was noted. Palpation over the

femoral vein under Poupart's ligament now produced great pain. An infiltrated cord, corresponding to the course of the vein, however, could not be made out yet. This latter phenomenon became apparent within the following days, when the whole extremity began to become œdematous. During all this time the patient seemed to suffer intensely. A well-known medical man of this city, later, also, a specialist in neurology, were called in consultation. They confirmed the diagnosis of thrombosis of the femoral vein and of a peripheric neuritis principally situated in the crural nerve. The œdema of the extremity never became very pronounced, pointing to the fact that we here had to deal with an incomplete occlusion of the lumen of the vein. When in the beginning of the third week after the operation all symptoms slowly subsided, the other extremity was attacked in a similar manner. It was fully four weeks before this extremely annoying complication had disappeared, and eight weeks before the patient was able to leave her bed.

CASE II.—About a year after this observation, I had to perform an interval operation on a young lady of twenty-four. She, too, had been suffering a few years ago with repeated slight attacks of pain in the region of the appendix, but had never had a more serious attack of inflammation. Six weeks ago a sudden onset of symptoms had led her attending physician to diagnose appendicitis.

On December 6, 1898, the intramuscular operation was done. A picture very similar to the one just described was found around the caput coli. Many membrane-like, tense, old adhesions were encountered, and in one of them was found suspended a very small, pipe-shaped appendix. The lesions proved to be a real counterpart to the one just described, except that more pronounced symptoms of acute inflammation within the peritoneal cavity were absent. After the removal of the appendix, the wound was entirely closed with tier sutures, as usual. The pathologist's report upon the examination of the appendix confirmed the diagnosis of subacute appendicitis.

The patient's recovery during the first week was uneventful, except that vomiting and retention of urine during the early days of convalescence gave her a great deal of trouble. In the beginning of the second week she commenced to complain of pain in the region of the spot where the left femoral vein passes under-

neath Poupart's ligament. The case observed about a year ago, the history of which I have just related, was too vividly in my mind yet, not to have made me think primarily of an advancing thrombosis of the left femoral vein. And, true enough, it did come on, with all the concomitant symptoms observed in the first case, only milder in degree. When, after about ten days, the symptoms were subsiding, the right lower extremity was similarly attacked, but less severely than the left.

On looking up the American literature at that time on complications after laparotomies for appendicitis, I failed to find any such occurrences recorded; although a medical friend told me that one of his patients, who was operated upon for appendicitis by another surgeon of this city, also developed thrombosis of the left femoral vein during after-treatment. It is evident that such an occurrence is by no means an unimportant complication. Besides the necessity of keeping the patient in bed for three to eight weeks, the great danger of embolism into the pulmonary artery or one of its branches is always imminent.

It was pressure of personal work that prevented me from publishing my cases at the time when they were observed. Not long afterwards, May 13, 1899, K. G. Lennander, of Upsala, in the *Centralblatt für Chirurgie*, published a very interesting article on "The Possibility of Avoiding Thrombosis in the Veins of the Lower Extremities after Operations requiring a Longer Rest in Bed." "As is well known among surgeons," he says, "thrombosis of the superficial or deeper veins of the lower extremities,—sometimes of the main trunk of the femoral vein and the external iliac—may follow laparotomies and radical operations for hernia with normal healing. As a rule, they appear within the second or third week after operations, sometimes also later." He has observed this complication in five interval operations for appendicitis, in three of which it occurred on the left side; he also noticed it oftener in women than in men. As regards the etiology of the trouble, he believes that the possibility of compression of the respective veins by the dressing, as also the possible coagu-

lation of the blood in the veins of the left lower extremity as a result of constipation, should be excluded. Extensive inquiries made by Lennander not only among his countrymen, but also among surgeons of other lands, show that the conviction prevails that the complication is of infectious origin, that it is rare, but serious, and that apparently nothing can be done to prevent it, except to observe a most rigid asepsis. The infection, of course, need not start from the operative field, but may originate elsewhere, especially in the intestinal tract. In all cases where wound infection does not come into question, it is difficult to determine the nature and starting-point of the infection. The fact that its appearance is generally followed by rise of pulse and temperature does not prove that the latter phenomena is necessarily due to infection.

In the case of a thrombosis, changes in the blood within the thrombosed vessel as well as in the tissues immediately surrounding it may have set in, and from these areas poisonous albuminoid substances may be absorbed by the system, and thus produce rise of temperature and increased action of the heart.

Lennander's advice for the prevention of this complication is to raise the lower end of the bed of the patient by ten to fifty centimetres immediately after the operation, and to leave it so during the entire time the patient is obliged to remain in bed. The more exhausted the patient was before operation and the more anæmic, the higher should be the elevation. If patients are annoyed by it, the bed may be gradually lowered, but not below ten to fifteen centimetres.<sup>1</sup> At the same time the heart's action should be stimulated by subcutaneous injections of saline solution and tonics. During the first days after operation passive motions and gentle massage are to be practised; but just as soon as possible the patients should be induced to make active motions with their legs, provided a thrombosis has not yet set in. When varicose veins

<sup>1</sup> Some anæmic subjects sleep better when the lower end of the bed is raised. A few are unable to urinate in this position, in which case the bed must be lowered for the purpose.



are present, the extremities should be gently compressed with flannel or elastic bandages. Lennander particularly emphasizes his conviction that raising of the lower end of the bed is by far preferable to the raising of the extremity alone, for the reason that in the latter instance, especially if the patient's upper part of the body rests on a pillow, the seat of the disease is the deepest part of the venous system.

A few days after the appearance of Lennander's article, Henry C. Coe of this city read a paper entitled "Crural Thrombosis following Aseptic Cœliotomy"<sup>1</sup> before the twenty-fourth annual meeting of the American Gynæcological Society, held at Philadelphia, May 23-25, 1899. "Occurring as it does," he says, "in simple cases in which a rapid recovery had been confidently expected, and at the end of the first or beginning of the second week, when all anxiety regarding the condition of the patient has been dismissed, its appearance is as unexpected as it is unwelcome."

Coe, of course, views the subject from the gynæcological stand-point. He cites among others the article of Wyder, entitled, "Embolism of the Pulmonal Arteries in Obstetrical and Gynæcological Practice,"<sup>2</sup> which covers a series of twelve cases with eight deaths, from the gynæcological clinic at Zurich. In all of these a careful post-mortem examination was made. He further mentions the article of Mahler, who, in a treatise on the same subject, reports fourteen fatal cases of pulmonary embolism—out of twenty-two observed—that occurred in the Dresden Clinic between 1884 and 1894, seven of them after gynæcological operations. In twelve an autopsy could be made.<sup>3</sup> Mahler calls attention to the more serious significance of intrapelvic as compared with crural thromboses, since in the crural veins thrombi are apt to become organized, while in the pelvic veins, in which there are no valves, the clot may extend up into the iliacs, whence emboli may be car-

<sup>1</sup> Medical News, July 1, 1899.

<sup>2</sup> Sammlungen klinischer Vorträge, No. 146.

<sup>3</sup> Thrombosis, Pulmonary Embolism, and Sudden Death. Essays from the Gynæcological Clinic at Dresden. Geburtshülfe und Gynäkologie, Vol. ii, p. 72, 1895.

ried directly to the lungs. With regard to crural embolism he adds that the absence of œdema is not necessarily an indication that the trouble is less serious.

Professor W. H. Welch, of Johns Hopkins University, whose opinion on the subject Coe requested, calls attention to the fact that crural thrombosis has been noted in several instances as a complication of appendicectomy. He inclines to the hypothesis that "such cases are due to infection," and adds, "what is needed is an anatomical and bacteriological examination of the thrombi in these cases; but as the termination is usually favorable, the opportunities for such examinations are necessarily rare." Coe reports six cases of post-operative thrombosis, three of the pelvic venous system and three of the crural vein, all of which terminated favorably. In three of these patients the appendix also had been removed. He, too, supports the view that septic infection of some kind is responsible for the complication; although he confesses that a careful review of the literature has failed to establish the etiology of postoperative thrombosis, especially with regard to the important question of septic infection.

I personally agree with the colleagues who consider infection to be a causative factor of the complication under discussion. I was too much impressed by the almost absolute similarity of the two cases reported to-night, to be able to banish the thought that the bacterium coli, or staphylococci, or streptococci, a few of which most probably were still present, though dormant, in the old adhesions, became active again, and after entering into the circulation were yet the cause of the trouble. They found a good soil to settle at the spot where circulation is most impeded in bedridden patients whose upper body is slightly raised, viz., in the femoral vein underneath Poupart's ligament. Both patients, as stated, were anæmic, but did not suffer from any varicosity of the lower extremities.

It is, of course, also possible that we have to deal with autoinfection, the agent being absorbed from the intestinal tract, perhaps in direct consequence of the surgeon's manipu-

lating the latter. Those who incline to this explanation might do wisely to subject the alimentary canal of their patients to a preliminary disinfection by drugs, before doing the operation.

That the mechanical theory of the development of a thrombosis of the femoral vein, as brought out by Lennander, must not be lost sight of, stands to reason. I have since, in quite a number of cases on whom I performed laparotomy, especially in anæmic women, insisted upon the raising of the lower end of the bed during the first two weeks of after-treatment. It would be interesting, indeed, if experience would show that by such raising of the lower end of the bed the occurrence of femoral thromboses could really be prevented; that is to say, if we found that the complication occurred only in such cases where this prophylactic measure was omitted. The infectious theory, which, according to current opinion, plays a principal rôle in the development of the trouble, would then, of course, have to be modified.

## II.—INTESTINAL OBSTRUCTION FOLLOWING SOME TIME AFTER OPERATION FOR ACUTE PERFORATIVE APPENDICITIS.

CASE I.—In September, 1888, I was hurriedly called by a colleague to operate on a young girl of twelve, for acute general peritonitis due to perforation of a peri-appendicular abscess which had just occurred. He had treated the child for about six days for a perityphlitic inflammation, when suddenly a severe chill set in, which was promptly followed by all the well-known symptoms of intra-abdominal perforation. At the operation which was done about two hours later, a large amount of pus was evacuated through an oblique incision over the seat of the appendix. The latter was involved in a mass of firmly adherent intestinal coils. In view of the patient's condition, I desisted from further search for the appendix. (To-day I should certainly persist in my efforts to try and extirpate the organ, fighting a threatening shock by an intravenous saline solution, etc.) The abdomen was drained by gauze packing to all sides and the wound left wide open. Pulse and temperature soon dropped to normal. On the morning of the fourth day the patient's condition suddenly changed; she stopped passing gas, commenced vomiting, and developed an increasing

tympanitis. The vomiting soon assumed a faecal character. With the hope of finding the cause within or very close to the wound, the patient was superficially narcotized and the various pieces of gauze were gently withdrawn. It was seen that at two different spots the coils of the small intestine, which had crowded into the wound, had become adherent to each other and kinked at a sharp angle. It was, of course, an easy matter to separate the recent adhesions and to restore proper intra-intestinal circulation. The distal portion of the gut promptly refilled and the obstruction was relieved; retamponade. The girl was better at once and went on convalescing. In the fourth week of after-treatment she developed a septic pneumonia, to which she succumbed, in spite of careful nursing, in the tenth week after the operation.

CASE II.—On August 13, 1897, at 3 A.M., while staying at one of the hotels in the upper part of this State during my summer vacation, I was called by a party of gentlemen to come with them at once to see a patient who had been stricken down with all the symptoms of perforative appendicitis on the preceding afternoon when on a fishing trip. Owing to lack of proper public travelling facilities, they had made a night trip of several hours in the private launch of one of the gentlemen who called on me. They presented a letter from Dr. M. H. Turner, of Ticonderoga, stating that a gentleman of thirty-two, who had been well during the last days, had, under excruciating abdominal pains, suddenly developed a pulse of 132 and a temperature of almost 104° F. at 4 P.M. After having prescribed for him, the doctor saw him again at 11 P.M., and found all clinical symptoms on the increase. Deeming surgical interference indicated, he asked me to come and see the case with him. It was evident from the trend of the letter, as also from the explanations of the gentlemen conveying the letter, that only immediate operative interference could save the patient's life. Fortunately, I was to some extent prepared for such work. The reason for this was an incident which occurred some years ago, and which I may perhaps be permitted to relate here.

In 1888, when about to leave for the mountains, I received a request from a patient of mine, who was then staying at a hotel near the one at which I intended to spend my vacation, to do an operation on him. I consequently prepared myself for the occasion. On the day of my departure the operation was counter-

manded. However, my trunks were packed, and so my instruments, etc., went along. It now happened that during my stay my little daughter fell from a chair, contracting a perforating wound of the mouth in her right cheek. Only the circumstance that I was prepared for minor surgical work saved her from a most hideous scar, which she would otherwise have carried for the remainder of her life. Since then I have made it a rule not to go to the country without being prepared for minor operative work, a precaution which, by the way, I think might with advantage be taken by every physician, and now enabled me to come to the rescue of a dying man.

As it was, I rapidly prepared myself, and off we went at the dawn of day on a trip of sixteen miles down the lake, calling on our way for my friend, Dr. Henry J. Wolf, of New York,—who also was spending his summer vacation on the lake,—to assist me.

Arrived at the point of destination, I found the patient, Mr. W. B., of C., with symptoms still more serious than noted at the time of the report. He had a pulse of 142; the pain was excessive in the right iliac region; also very marked in the left lumbar region and over the entire abdomen; dulness on percussion in the right groin, marked tenderness over Douglas's sac on rectal palpation, and a temperature of almost 104° F. The patient was said to have passed a severe attack of pulmonary tuberculosis four years ago, but had evidently been much improved by a prolonged stay in the mountains. He now seemed to be one of the wiry sort of men. It was further ascertained that he had been on the operating table for appendicitis, eight months ago, at his home, but that, on account of a skin eruption which had suddenly appeared and resembled measles, the anæsthetic was not administered, and the idea of operating abandoned for the time. He had then recovered from the attack, but, upon the urgent advice of his physician, had come to New York for the purpose of consulting a surgeon with regard to the advisability of an interval operation. The surgeon, however, had opposed the view of the family physician, taking the ground that the attack he had passed had been one of appendicular colic, but not of appendicitis; and that an operation was not necessary. With this diagnosis he had returned home; and now, six months later, this serious illness had suddenly developed while in the mountains for recreation.

The facts were explained to the patient's wife and then to

himself, and permission for an immediate operation was given. The room, small, with comparatively poor light, but clean, was rapidly prepared. The instruments, towels, etc., were boiled and operation proceeded with, Dr. Wolf assisting me in the operation and Dr. Turner attending to the anæsthesia. On opening the abdomen, a large amount of pus flowed out. The appendix was perforated and partially gangrenous. Pus filled the small pelvis and oozed out from between the coils of the neighboring intestines. Far-reaching tamponade with aseptic gauze strips was carried out after the appendix had been removed; a number of tampons were also pushed down into Douglas's sac and the wound left open. The patient had stood the operation comparatively well, although he needed some hypodermic stimulation during and after our work. I stayed with him for nearly two days, and was pleased to note that he went on recovering. The gauze tampons were removed on the fifth day after the operation and the recesses of the wound slightly retamponed. With the view to facilitating after-treatment, which so far had taken up more or less of my time for a whole week, the patient, thanks to the generous offer of a New York gentleman who took an interest in the case and placed at our disposal his commodious private launch, was removed to the place where I was staying. Although he was still slightly feverish, he stood the trip very nicely. In the course of the following days, under careful dressing, pulse and temperature dropped still farther, until on the twelfth day the patient seemed out of danger (highest temperature, 100.6° F.). That night, on the way up to my room, I happened to once more drop in at my patient's, and found his condition suddenly much changed. Pleasant, cheerful, and smiling as he had appeared a few hours before, he now showed an anxious face, was groaning, and complained of sudden sharp abdominal pains setting in at short intervals. Upon my inquiry, the nurse reported that shortly after an enema, which had been given towards evening and had induced a free passage, he had had a second small stool, which appeared to contain pure pus of very fetid odor. It was clear that an abscess, which had been present all the time between the coils, had suddenly perforated into the intestinal tract. Where the perforation had occurred was, of course, difficult to determine. On examining the patient more closely, I found a circumscribed bulging on the left of the median line and three fingers' breadth below the umbilicus. This spot

was more resistant and quite painful to the touch; it also gave a much higher tympanitic resonance than the surrounding coils, the symptoms corresponding exactly to those described as "pathognomonic symptoms" due to strangulation or axis-rotation of acute intestinal obstruction, by von Wahl, more than ten years ago.<sup>1</sup> There was little doubt in my mind that we had to deal with acute intestinal obstruction. For the time being I ordered suppositories, which were on hand, and hot-water bags, and asked the nurse to call me if the suffering should increase. At 4 A.M. I was called, and found the patient in great agony. Sitting at his bedside, I clearly heard how every few minutes a loud, gurgling sound from within his abdomen recurred and each time caused the patient great distress. Although he had not taken anything by mouth since my last call, he had vomited a large amount of liquid, corresponding to that generally found in the upper part of the jejunum. The diagnosis of acute intestinal obstruction was now established beyond a doubt. In view of the peculiar circumstances of the case, I asked Dr. De Forest Willard, of Philadelphia, who was a guest at the hotel, and Dr. A. Jacobi, of New York, who was staying at his cottage near by, to see the patient with me. The two gentlemen fully concurred in my diagnosis, and also in the advice I had given to the patient and his wife—immediate second operation.

On opening the abdomen in the median line between umbilicus and symphysis, a greatly distended coil of small intestine at once presented itself, corresponding exactly to that bulging spot which we had been able to map out before operation. It was very much injected and kinked in two places where the omentum had become adherent. On loosening the adherent omentum, it suddenly flattened out, and, thinking that the whole trouble had been found, we commenced sewing up again. Suddenly, however, the same gurgling sounds, which had been noticed before the operation, were again heard. It was sure that the true obstruction had not yet been found. Of course, suturing was abandoned, and we searched farther. While Dr. Willard, who kindly assisted me, held the left side of the wound well apart, we could notice that the same coil passed towards the left lumbar region, where it seemed to be adherent. It did not respond to even a rather strong pull.

<sup>1</sup> *Centralblatt für Chirurgie*, 1889, p. 153.

I therefore proceeded to carefully sever the adhesions. Suddenly, a large amount of very fetid pus welled up from the region of the left kidney. We had struck an abscess, the walls of which were formed by the descending colon on the outer side and a number of coils of small intestine towards the median line. The pus flowed freely over the whole surface of the wound, and was mopped away as rapidly as possible. On attempting to further separate the present adhesions and straighten out the much adherent intestines, a large portion of the latter had to be packed out of the abdominal cavity and surrounded at once by hot towels, as well as that could be done under the circumstances. To our great annoyance, one coil had become ruptured very close to its mesenteric attachment. It was sutured at once. By this time the patient seemed to be in a state of profound collapse, and Dr. Jacobi, who kindly conducted the anæsthesia, was strenuously occupied in the difficult task of sustaining the patient's vitality with continued hypodermic injections. It was necessary to hurry the operation as much as possible, lest we lose our patient on the table. After rapid tamponade of the left lumbar region, we therefore commenced to reduce the intestines which had been packed out; but it was absolutely impossible to replace them, on account of their marked tympanitis. Therefore an incision was made into one of the coils and as large an amount of liquid fæces and air as possible pressed out of this opening. The longitudinal wound was rapidly sewn up again, and now reduction of the intestines could be accomplished with ease. Of course, the whole wound was left open; a number of through-and-through sutures of linen-thread were put in and tied with a bow-knot. The patient was brought to bed in a sinking condition.

While telegrams to the effect that he was dying were sent to the other members of his family, he gradually picked up and, to the delight of all, showed a great deal of recurrent vitality towards evening, and thereafter slowly recovered. He returned with me to the city in the latter part of September, and on November 20 left for his home with the wound entirely closed.

Last summer I saw him again in perfect health. He stated that he had never felt better in all his life.

In talking over the probable cause of the sudden appearance of the intestinal obstruction with the two gentlemen



who so kindly assisted me, and to whose timely and most valuable help the patient principally owes his life, we arrived at the following conclusion. An abscess, which at the time of the primary perforation of the appendix and spreading general peritonitis had been forming in the left lumbar region between the descending colon and the neighboring coils of small intestine, had been slowly increasing in size, and induced, perhaps, by the enema given on the twelfth day, perforated into the descending colon. One of the coils of the small intestine, which had been under great tension while the abscess cavity was fully expanded, now, when the tension was suddenly withdrawn, became kinked, and thus formed the cause of the obstruction. Another kink then occurred farther up in the coil where the omentum had become adherent.

I hope I may be pardoned for having related this case at such length. I thought, however, that the interest that attaches to it in all its phases, and the peculiar circumstances under which the operations were performed, would warrant me in giving so detailed an account of it.

CASE III.—J. J., eight and a half years of age, had been well up to Christmas, 1897, when he was for the first time taken sick with intense abdominal pains while in school. They lasted for a few hours only. He was kept in bed for a few days, and then was perfectly well again.

On May 19, 1898, early in the morning, he had a second attack of appendicitis, accompanied by vomiting. The pain in the abdominal region was very severe. A purgative given by the mother produced frequent stools. Later in the day the child was able to see the family physician at his office. When the latter called at the patient's house in the afternoon, the pain had increased; pulse, 108; temperature above 102° F. The child passed a comfortable night, and pulse and temperature were normal the next morning. At 1 P.M. of that day he had a large, spontaneous stool, during which he suddenly screamed with pain, and was unable to finish the movement. He was put to bed and the doctor sent for, who asked me to see the patient with him. Upon my arrival, I found a pulse of 120; temperature of 102.6°;

respiration, 40. The boy's face was pinched, his abdomen contracted, on deep inspiration very painful. There was pain on pressure over the whole abdomen, mainly over the right side. A slight resistance was distinctly palpable in the region of the right iliac fossa; there was also dulness on gentle percussion; tongue moist. Immediate operation was advised and performed at 8 P.M. On opening the abdomen, a large amount of thin, odorless sero-pus escaped. Parietal and visceral peritoneum in the immediate neighborhood of the incision were much injected. On pulling out the caput coli, it was seen that at its junction with the appendix it was adherent to the parietal peritoneum and iliac fossa. By gentle manipulation the appendix could be stripped off its adhesions and lifted out of the abdominal cavity in front of the wound. At this moment a number of drops of very fetid, sanguinolent pus oozed out of the appendix, but fortunately dropped on the skin. Rapid temporary packing of wound. It was then seen that at the junction of the proximal and distal halves of the appendix, the former of which appeared to be normal, there was a perforation on the convex side; the distal half was much distended by pus, and contained, besides, a movable faecal concretion. The appendix was removed, and the wound carefully packed with strips of sterile gauze, also down into the small pelvis. A few stitches were then put in both ends of the wound. The patient stood the operation well. Pulse and temperature dropped to normal on the following day. Convalescence was somewhat slow, but uninterrupted, so that the boy could leave for the country early in July. Thereafter I saw nothing of him until the early part of last year, when, on April 1, I was called in by the family physician to again visit the little boy, who had been taken sick the day before with nausea and abdominal pain, about one and a half hours after a heavy supper. The pulse was slightly accelerated; temperature,  $101.4^{\circ}$ . When I saw the child, twenty-four hours after the onset of these symptoms, it was but natural, in view of the known direct cause of the trouble and the fact that the appendix had been removed, to think of a catarrhal condition of the intestinal tract, due to mistaken diet. The abdomen was slightly sensitive all over and much sunken. There was no localized bulging anywhere. However, the pinched look of the patient made us consider the probability of a more serious condition. Still, pathognomonic symptoms for the latter were as

yet missing; and I recollected, too, that the child often had such a facial expression when sick before. I saw the little patient again three days later, on April 4, at 2.30 P.M. In the morning of that day the attention of the family physician had been drawn to a swelling in the epigastric region. Repeated enemata had been ordered, and had brought away scybala with gas. At my call I found pulse and temperature normal. Every few minutes sharp abdominal pain with a gurgling sound set in. On auscultation much intestinal motion could be noted. The abdomen was slightly sensitive to the touch. I learned that his look had been more anxious in the morning, and that small quantities of a greenish fluid had been vomited at short intervals. The diagnosis of incomplete intestinal obstruction was now made, and operation done at the German Hospital at 7 P.M. Median incision, which had to be lengthened so that it extended equally far above and below the umbilicus. The small intestines were found to be much distended. They were rapidly packed out of the cavity and well surrounded by hot towels. The obstruction was quickly found in the right iliac region, in the shape of a minute band not quite the thickness of a knitting-needle, which passed from the cæcum over the small intestine to the root of the latter's mesentery. The constriction was located not far from the ileocæcal valve. It was divided between two ligatures. The lower portion of the intestinal tract, which had been in a rather collapsed condition, immediately filled with gas and liquid. Besides some serofibrinous deposit on the gut, there was no visible sign of the several days' constriction. Since it struck me as unlikely that this single band should have been the only remnant of the extensive peritonitis passed through one year ago, I followed up the small intestine in order to find a possible second obstruction; however, with negative result. The greater portion of the small intestine had by this time been eventrated. Now a coil was drawn out to the side of the abdomen over a pus basin covered with a sterilized towel, and a small transverse incision was made in it with the scissors. A good deal of thin faecal matter and gas passed. It was stitched up again immediately, under constant gentle saline irrigation, with a continuous suture of catgut through the mucosa and a Lembert silk suture on top. The same procedure was then repeated on a coil on the opposite side of the abdomen. The reduction of the large mass of gut was now comparatively easily

accomplished with the help of an aseptic towel. By this time the pulse had risen to 130 and was rather weak. An intravenous saline infusion of 750 cubic centimetres, at 120° F., rapidly improved the heart's action and produced a profuse discharge of liquid through the abdominal wound. The latter was sewn up completely with through-and-through silkworm-gut sutures.

April 5. The boy has been quiet since the moment of the operation; pulse somewhat rapid; temperature below 101° F. First passage of gas six hours after the operation. The next day pulse and temperature were normal and the boy in a splendid condition. He left the hospital on the 18th of April and has been perfectly well since. Both scars are firm, without showing a tendency to ventral hernia.

The cases reported illustrate nicely the possibility of the occurrence of intestinal obstruction at any time after operations for acute appendicitis complicated by localized or general peritonitis. The diagnosis is easily determined if the obstruction is at once complete; much less so, however, if it is incomplete, that is to say, if gas still passes per rectum. The preceding cases further show how important it is to bear in mind that this serious trouble may occur at a more or less distant period after the primary operation. If the surgeon duly considers this possibility, a careful combination of the symptoms will soon enable him to correctly diagnose the trouble. As in that case operation will promptly follow, it will generally be in time to save the patient's life.

# REPORT OF THREE CASES OF PROPERITONEAL HERNIA.

By JOHN CHADWICK OLIVER, M.D.,

OF CINCINNATI.

CASES in which a hernial tumor is reduced *en masse* are by no means common, hence one is justified in placing the records of such cases before the profession. The first case herewith reported is peculiar in that no history could be obtained of prolonged efforts at taxis, except such as were made by the patient. A further point of interest is found in the fact that the actual condition was only discovered upon the post-mortem table.

CASE I.—J. R. was a stout, well-formed Italian, who entered the Cincinnati Hospital July 4, 1900. The history was that his bowels had not been evacuated for four days previous to his entrance. The patient said that a hernia had existed upon each side, but that they had not troubled him for some time past.

When seen in the ward he complained of severe pain in the abdomen associated with nausea and vomiting. The abdomen was distended, but tenderness was not marked. The abdominal wall was quite heavily coated with subcutaneous fat. The vomited matter had the color, odor, and appearance of fæcal matter. His pulse was 88 and temperature 97.2° F.

Examination of the inguinal regions showed the right side to be fuller than the left, but no hernia could be made out either by external examination or by a finger passed along the inguinal canals.

As repeated attempts had been made to evacuate the bowels by cathartics and enemata, no time was consumed by further efforts of this nature. After shaving the abdomen, the right side appeared considerably more prominent than the left. In view

of this, an incision was made over the inguinal canal on the right side. This revealed the presence of an old, entirely empty sac. This incision was closed with a continuous suture and a new one made in the median line. A tight constriction of the bowel was encountered just to the left of the incision. The bowel was drawn out from the constriction, which presented firm, hard edges. Because of the depth of the opening from the surface of the abdomen careful examination was impossible, but the conclusion was that it was a rent in the mesentery. The opening was with great difficulty closed with a running suture of catgut.

When first released, the coil of small bowel, nine inches in length, was shiny and purple, but after the application of hot towels it assumed the bright red, glistening appearance indicating restoration of circulation.

His condition continued to be very satisfactory all the next day and the following night, but early the following morning his pulse began to fail, dyspnoea developed, the patient became very restless, and death took place at eleven o'clock on the morning of July 6.

The post-mortem examination, conducted by Dr. A. I. Carson, revealed that a portion of small intestine, about nine inches long, was in a state of beginning gangrene. At either end of this portion a line of constriction, where the gut had been incarcerated, was well marked. From one end of the gangrenous portion to the other, a semicircular line through the mesentery separated that part of the mesentery which had been strangulated from the neighboring uninjured portion. On the bowel side of this line the mesentery was congested and showed beginning gangrene close to the intestine.

When search was made for the constricting band, it was found securely closed by suture. When the suture was removed, the opening proved to be the mouth of a hernial sac lying wholly within the abdomen. It evidently belonged to the hernia on the left side, but the sac and opening had been dislodged from the inguinal canal and pushed bodily into the abdominal cavity. The fulness noted over the right inguinal canal was evidently caused by the presence of a hernial sac on that side, while the apparently normal left side was not so full because of the absence of the sac which was formerly present. In this particular case the apparent fulness of the right side was a very misleading symptom.

CASE II.—S. S., aged forty-three, came to the Cincinnati Hospital, September 13, 1892, with a strangulated hernia upon the right side. Four weeks before, Dr. E. W. Walker had reduced the hernia by taxis. At that time the hernia was strangulated. Patient had worn a truss for several years.

The present attack began about midnight. He had vomited twice since that time. The ice-cap, morphia, and moderate taxis produced no effect. The patient was anæsthetized and taxis again resorted to. During this manipulation the swelling was very considerably reduced, but the finger passed through the external ring (which was very large) detected bowel in the inguinal canal above the external ring, and this could not be pushed back into the abdomen.

Being certain that the constriction was still present, the inguinal canal was cut down upon. No constriction was present at the external ring, but a finger passed into the canal detected a large section of bowel behind the muscles; the incision was extended upward, the sac opened, and the constriction found at the internal ring. This ring, with the parietal peritoneum, had been pushed away from the transversalis fascia. The ring was divided and the bowel replaced.

The patient made an uninterrupted recovery and was discharged from the hospital on the twentieth day. (This case was reported in the issue of the *Lancet-Clinic* of February 4, 1893.)

CASE III.—J. B., aged thirty-one, entered the Presbyterian Hospital, the evening of February 17, 1900, with the history of having had a hernia upon the left side. The testicle on that side had never descended completely, but lay in the inguinal canal. Dr. J. F. Heady, of Glendale, saw the case in the afternoon, and advised immediate removal to the hospital for operation.

Examination revealed the absence of the left testicle from the scrotum, and a large mass over the inguinal canal. This mass extended upward and outward from the region of the inguinal canal.

Operation revealed the presence of a large mass of bowel partly within the canal, but the larger portion had passed upward and outward behind the external oblique fascia. The constriction was divided, the cord lengthened, and the testicle carried into the scrotum, where it was retained by suture. The various steps of

a Bassini operation completed the operation. The patient made an uneventful recovery.

Three possible varieties of this condition are described in "Handbuch der praktischen Chirurgie," iii, 1, page 747: (1) Properitoneal—in which the hernia lies in the subperitoneal layer; (2) Interstitial or interparietal—in which the hernia lies between the internal and external oblique muscles; and (3) Inguinosuperficialis or subcutaneous—in which the hernia is covered by the skin and superficial fascia alone.

The first and second cases here reported belong to the first class, while the third case represents the second class.

The establishing of a diagnosis is the most difficult matter in these cases, but the symptoms will almost always indicate an obstruction of the bowels, and, in the absence of a positive, differential diagnosis, these symptoms will indicate the necessity for a laparotomy. Opening the abdomen will lead to the discovery of the constriction and its relief, although the nature of the constriction may not be clear at the time of operation.

This condition was first thoroughly described by Goyrand in a paper read before the Paris Academy of Medicine in 1836. In 1881, Kronlein published histories of twenty-four cases,—all he was able to collect from the literature. In 1889, Dr. Van Buren Knott (*ANNALS OF SURGERY*, Vol. xxx, page 703), states that he has been able to find mention of but sixty-six cases on record.



# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, December 26, 1900.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

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## TRAUMATIC RUPTURE OF THE ASCENDING COLON.

DR. ARTHUR L. FISK presented a man who, on the 29th of October last, while crossing the street, was run over by a hose-carriage, one of the wheels passing diagonally across his right loin. He was immediately taken to the Trinity Hospital in a condition of shock, with a subnormal temperature. Examination showed a large swelling in the left side of the abdomen, especially in the lumbar region, which was regarded as a hæmatoma. There was no blood in the urine, and when his bowels moved the stool was also free from blood. The abdominal muscles on the left side were distinctly rigid.

On November 4 there was fluctuation in the mass referred to, and the man began to have some fever. The mass was thereupon incised in the loin, and a large quantity of pus evacuated; this pus had a faint fæcal odor. Two days later there was a discharge of fæces through the wound, and for two weeks all the fæcal contents of the bowels were evacuated in this way. On November 21 there was a severe hæmorrhage from the sinus, a second on the 25th, and a third on the 30th. From that time on the sinus began to close, and now only a small opening remains, and the fæcal discharge has ceased altogether. A finger inserted through this sinus passed directly into the ascending colon.

In reply to a question as to whether he regarded the location of the rupture as extra- or intraperitoneal, Dr. Fisk replied that he thought it had occurred posteriorly and outside the peritoneum. The man never had any abdominal symptoms excepting some rigidity of the oblique muscles. In opening the mass, he had simply made an incision through the skin.

DR. F. KAMMERER suggested that the rupture of the colon was possibly secondary and not primary traumatic. The accumulation of blood within the folds of the mesentery of the colon may have become infected, and subsequently necrosis of the intestinal wall, with a temporary opening of the intestine, may have resulted.

DR. GEORGE E. BREWER thought it probable that there was an abscess, which broke into the gut, rather than a primary rupture. Otherwise, faecal matter would have escaped from the sinus earlier than it did.

### TRAUMATIC TORTICOLLIS.

DR. ROBERT H. F. DAWBARN presented a boy, who, about two months ago, received a blow from a stick upon the side of the jaw. This produced a small wound on the jaw, which was closed by the family physician, and the wound was then dressed. At this time the boy's mother noticed that his head was strongly deviated towards the left; this she attributed to the dressing; but when the latter was taken off, the head still remained in the oblique position.

When Dr. Dawbarn first saw the patient, six weeks after the receipt of his injury, the head was found to be markedly deviated towards the left, and posteriorly there was a protuberance, which he thought was the lateral mass of the atlas or a mass of bony callus. There is also a swelling of the neck anteriorly, which is due to enlargement of the thyroid gland. This the mother is positive did not exist previous to the time of the injury. Any attempt to move the boy's head causes severe pain. Two radiographs of the neck were taken, but these did not throw much light upon the true nature of the injury.

Dr. Dawbarn said that in his opinion there was either a fracture or a dislocation (or both) of the atlas. On this account he did not dare to employ strong extension. No protuberance could be felt inside the mouth.

Dr. Dawbarn said the patient had been examined by several surgeons, as well as by Dr. B. Sachs, and all of them were inclined to regard it as a case of fracture or dislocation of the atlas.

DR. ROYAL WHITMAN said he thought the case was one of traumatic torticollis. There was evidently great muscular spasm,

and on account of the spasm the head could not be moved without causing much pain.

Dr. Whitman said he had seen a number of cases very similar to this one, with equally marked deformity. The twisting of the head caused the transverse process of the axis to become prominent.

The speaker said that the main indication in the treatment of these cases was to support the head, as the patients suffer much pain when the head is moved or when lying down. He would suggest for this case the application of a plaster jacket and a jury-mast. Under the support and traction of this appliance the deformity would probably gradually disappear, or it could be immediately rectified under an anæsthetic, after which the head might be fixed in a plaster bandage.

Dr. FISK said that a year ago, last summer, he saw a case in which the symptoms were identical with those in Dr. Dawbarn's case. The case proved to be one of traumatic torticollis, and reduction occurred during the night. This condition, Dr. Fisk said, has been reviewed in a paper by Walton and Richardson, and they describe a method of reduction by rotation of the head to the opposite side and extension.

Dr. CURTIS said that some years ago he saw a similar case. There was extreme rotation of the head and absolute rigidity, but no real bony prominence could be felt. On that account he hesitated to make a diagnosis of dislocation of the spine, in spite of the peculiar position of the head. The symptoms gradually improved without treatment, and the patient made a complete recovery. He was not inclined to regard the case shown by Dr. Dawbarn as one of either dislocation or fracture. The symptoms appear to be due to a spasm of the muscles.

Dr. KAMMERER referred to a similar case which he had seen many years ago, and the diagnosis of which gave rise to considerable discussion. The case was regarded by some as one of dislocation, but after keeping the patient in bed for two or three weeks and treating him with an extension apparatus, he made a complete recovery. His recovery proved that there was no dislocation or injury to the bone, but that the case was one of simple traumatic torticollis.

Dr. DAWBARN said it was the presence of the bony mass on the left side of the neck at the back which had led him to believe

that the case was something more serious than one of traumatic torticollis, though unquestionably the latter was the chief cause of the position of the head. The muscular spasm, which was quite evident now, was, however, absent two weeks ago, when he first saw the patient. At that time, Dr. Dawbarn said, he was able to straighten the head by gentle manipulation; but the boy complained of so much pain that he gave up the idea of restraining it in that position in plaster of Paris.

DR. CURTIS asked Dr. Dawbarn whether he thought it would have been possible to straighten the head at all if the case was really one of dislocation or fracture.

DR. DAWBARN replied that it would possibly have been feasible with fracture, at least. As regards the future treatment of the case, the speaker said he intended to try partial correction by the application of plaster of Paris, and thus gradually attempt to get the head back into its normal position.

#### SOME ERRORS IN DIAGNOSIS IN CASES RESEMBLING APPENDICITIS.

DR. GEORGE E. BREWER read a paper with the above title, for which see page 590.

DR. A. J. MCCOSH said that probably every surgeon could recall cases similar to those reported by Dr. Brewer. Those engaged in gynæcological work especially are often much puzzled to distinguish between suppurative conditions of the tubes and ovaries and those of the appendix. Sometimes it is quite impossible to differentiate between them before the abdomen is opened, and even then it may be difficult to say which is the primary seat of the trouble. Not infrequently the appendages have become adherent to the appendix, either directly or by bands of inflammation, and even after their removal it may be impossible to make out where the trouble originated.

Dr. McCosh said he could recall many cases where he was unable to make the differential diagnosis between disease of the ovary and tube and the appendix, and in such instances the incision through the rectus muscle, as suggested by Dr. Kammerer and others, is very valuable. Gall-bladder disease and pancreatitis may also be confounded with appendicitis. Pancreatitis, the speaker believed, occurs much more commonly than is generally recognized. Dr. McCosh said he has a case under observation

now where he is unable to say whether it is one of pancreatitis, appendicitis, or cholecystitis. Pancreatitis, however, is much more apt to be confused with cholecystitis than with appendicitis. In a doubtful case of this kind which he recently saw he made a lateral incision, and found a gangrenous pancreas which he removed almost entirely, leaving only a portion of the tail. The patient made a good recovery, and is apparently enjoying perfect health: thus far no sugar has appeared in the urine.

Malignant disease of the intestine may also lead one astray. In a case of sarcoma of the cæcum which came under his observation, the patient, who was a butler in a physician's family, was apparently perfectly well until he was suddenly seized with vomiting and all the symptoms of acute appendicitis. He was at once sent to the hospital and operated on the same day. The incision was made over McBurney's point, and directly over a mass which was somewhat more movable than one would expect to find in appendicitis. Upon opening the abdomen, a sarcoma of the cæcum was found, which, with a few inches of ileum and colon, was removed, and the man making a good recovery and at the end of three years being in perfect health.

Dr. McCosh said that in cases of general suppurative peritonitis the appendix is usually presumed to be the origin of the infection, and in male subjects this is probably found to be so in nineteen cases out of twenty. In the female, however, it is somewhat different, the pelvic organs or stomach being found at times to be at fault.

About a month ago, the speaker said, there was a patient in the medical wards of the hospital who complained of epigastric pain which extended down towards the appendix. In addition to this, there was considerable fever and abdominal distention. The pain was mainly localized over the region of the appendix. After being kept under observation for forty-eight hours, the man was transferred to the surgical ward with the diagnosis of general septic peritonitis. Upon opening the abdomen the diagnosis was found correct, but the appendix, which had been suspected as the cause of the peritonitis, was found to be only slightly diseased. The autopsy revealed a gangrenous gastritis: a polypus had become gangrenous, and the middle coat of the stomach was riddled with pus.

DR. A. D. BEVAN, of Chicago, said he was particularly in-

terested in that portion of Dr. Brewer's paper which referred to kidney cases. The speaker said that about six months ago he saw a physician who had suffered from repeated attacks, which were apparently of appendical origin. After consultation the abdomen was opened, and when the appendix was removed it was found to be partially obliterated and contained some miliary abscesses. Before he left the hospital, he had another attack similar to the ones he had suffered previous to the operation. Immediately after this attack his urine was examined, and the microscope revealed the presence of blood. A radiograph of the kidneys was then taken and disclosed a ureteral calculus on one side. This calculus was probably the source of the man's attacks of pain, rather than the old inflammation of the appendix.

In another case, that of a woman with recurrent attacks of pain which were supposed to be due to inflammation of the appendix, the urine was examined and found to contain blood. An X-ray picture revealed a stone in the kidney.

Dr. Bevan said that the possible relationship between lesions of the appendix and kidney was interesting from another standpoint. About eighteen months ago he saw a patient who had a sharp attack of pain in the lower abdomen, followed by the presence of considerable blood (microscopic) in the urine. The case was regarded as one of renal colic, and no operation was done. Five or six days later a distinct abscess could be outlined, and upon opening the abdomen the appendix was found to be the source of the trouble.

Dr. Bevan said that after a sharp attack of appendicitis he has in a number of instances found evidences of blood in the urine with the microscope, and that, too, without any coincident lesion in the kidney. The speaker said he had no explanation to offer for this phenomenon.

In differentiating between lesions of the kidneys and appendix, the use of the X-rays will often prove serviceable. By this means, Dr. Bevan said, he has located stones no bigger than a pea both in the ureter and kidney.

As already stated by Dr. McCosh, malignant disease of the intestine may also be confounded with appendicitis. Several such instances had come under the speaker's observation.

DR. HOWARD LILIENTHAL said he would not stop to catalogue the various conditions that might be mistaken for appendi-

citis, and would only refer to one, namely, the abdominal pain which may precede an attack of acute gonorrhœal epididymitis. Repeated instances of this had come under his observation. In such cases there may be pain and tenderness in the region known as McBurney's point. In case No. 10, reported by Dr. Brewer, the pain may have been due to inflammation of the pelvic glands, secondary to involvement of the seminal vesicle which usually preceded the inflammation of the epididymis.

While various conditions have been mistaken for appendicitis, the converse is also true, and many conditions which are really due to inflammation of the appendix have been diagnosed as something else. For example, intestinal obstruction is extremely common as a symptom of appendicitis, and its presence may mislead one to regard the case as one of intestinal obstruction, pure and simple.

DR. WILLIAM B. COLEY said he had seen two cases of malignant disease with symptoms which closely resembled those of appendicitis. One was a young man of twenty-seven, who gave all the symptoms of appendicitis; but there was a mass in the iliac fossa which was larger than one would expect to find in that disease. Further examination revealed the fact that he had only one testis; and upon inquiry he said that three years before the opposite testis had been removed on account of an inflammation which had been pronounced tuberculous in character after a microscopical examination. Upon opening this patient's abdomen, a large sarcoma involving the cæcum was found.

The second case was that of a physician who had suffered from four or five apparently typical attacks of appendicitis. The case proved to be one of carcinoma of the cæcum, involving a large portion of the cæcum, with an adherent loop of small intestine which had become involved by continuity. Its removal necessitated a double resection of the small and large intestine. The patient made a good recovery from the operation, which was performed by Dr. Coley in May, 1899, and is still able to attend to his practice, December, 1900, although a recurrence has taken place. His weight is still normal, and there is only slight constipation.

DR. KAMMERER said that in his opinion conditions simulating appendicitis were more often mistaken for appendicitis than the reverse. Such errors would probably be of less frequent occur-

rence if we taxed our diagnostic resources a little more, but sometimes they are doubtless unavoidable. The speaker referred to two cases of appendicitis in which he thought the diagnosis was very difficult. One was the case of an elderly gentleman who had been failing for some months, but he had never had any symptoms referred to the appendix. Three weeks ago he had noticed a tumor, now about the size of a hen's egg, in the right iliac region. It was very movable and hard to the touch. There was no pain on palpation, and the pulse and temperature were normal, and had been so, according to the report of the attending physician. In view of these symptoms and the man's general condition, the diagnosis of malignant tumor of the cæcum was made. Three days later there was a complete change in the clinical picture. The temperature suddenly rose to 103° F.; the pulse was 130, and the tumor had increased in size and become attached. The case was now clearly one of appendicitis; but the patient had been allowed to leave for his country home for a few days, and great danger was narrowly averted. In another similar case, a movable tumor, the size of an egg, in a young woman gave great trouble from a diagnostic point of view. There was not the slightest local or general reaction, no history of previous attacks, and still, on operation, a gangrenous appendix was found in a small abscess-cavity among agglutinated intestines with firm, old adhesions.

Dr. Kammerer also reported the case of a man of fifty who gave a history of having had several attacks of what seemed to be appendicitis. In his last attack there was pain in the epigastric region which rapidly extended to the right side, and two days later there were symptoms of a localized peritonitis in the lower right abdomen. A diagnosis of probable appendicitis was made. Upon opening the abdomen, the appendix was found to be normal. There was a localized peritonitis on the right side, which was traced upward to the stomach, where two perforations were found, one on the anterior and the other on the posterior surface of the stomach.

Dr. JOHN B. WALKER said that last spring he saw a man, about thirty-five years old, who had had a pain in the abdomen for a couple of days, with some elevation of temperature. The case was looked upon as one of appendicitis and immediate operation decided upon. The operation was postponed until the fol-



lowing day, however, and then abandoned, as the man had in the mean time developed symptoms of typhoid fever, which proved fatal six weeks later from a secondary hæmorrhage.

Another patient, a woman twenty-two years old, was taken with a slight pain in the abdomen, and on the following day had a chill and was somewhat nauseated. The temperature was not much elevated. On the third day of her illness the temperature rose to 101° F. and the pulse to 120, and there was distinct localized tenderness. An operation disclosed an ulcer of the cæcum, and the patient subsequently developed a typical attack of typhoid fever. In the first case, the highest leucocytosis count was 10,000, and in the second it was 18,000, before the operation.

DR. DAWBARN said that two years ago he operated upon a case of appendicitis of apparently traumatic origin in the practice of Dr. Holly, of Greenwich, Connecticut. The patient had fallen across the wheel of a buggy, striking the lower portion of her abdomen, and subsequently developed symptoms of appendicitis. Upon opening the abdomen, the appendix was found to be apparently normal in appearance, and nothing was wrong with the tube or ovary. The appendix was removed, however, and upon splitting it, the mucous membrane was found to be in a gangrenous condition.

DR. L. W. HOTCHKISS referred to two cases in which the early symptoms indicated an acute abdominal inflammation, with distention, pain, and constipation. The abdominal symptoms persisted about forty-eight hours, and in both instances they were found to be due to a diaphragmatic pleurisy.

### CHRONIC INTESTINAL OBSTRUCTION DUE TO A GALL-STONE IMPACTED IN THE ILEUM.

DR. HOWARD LILIENTHAL reported this case and showed the specimen removed. The patient was a woman, sixty-four years old, who since Thanksgiving Day had suffered from symptoms of chronic intestinal obstruction, which gradually increased in severity. An examination failed to reveal any faecal impaction, but in the right iliac region a resisting body could be felt. Upon opening the abdomen and separating the omental adhesions, a hard body could be felt inside the ileum, completely obstructing the lumen of the gut. It was extracted through a small incision in the gut, which was immediately closed again by continuous

suture. At present, three days after the operation, the patient is in excellent condition. The foreign body removed was about the size of an English walnut, was rudely cubical in shape, and was probably a gall-stone.

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*Stated Meeting, January 9, 1901.*

The President, B. FARQUHAR CURTIS, M.D., in the Chair.

### UNILATERAL LARYNGECTOMY.

DR. WILLY MEYER presented a man, forty years old, who came under his observation in March, 1900, with a history of having become hoarse since the previous January. Upon inspection of the larynx, a tumor was found on the right side, which gave every indication of being malignant in character. Microscopic examination of a small piece removed by Dr. Gleitsmann, laryngologist to the German Hospital, proved it to be an alveolar sarcoma containing carcinomatous elements. On the 13th of March, under local anæsthesia, a preliminary inferior tracheotomy was done. On account of the unusually deep situation of the trachea, the largest sized tracheotomy tube was required, but did not fit well. A special tube with extra curve had to be made. Two days later the right side of the larynx was extirpated. With the patient in the Trendelenburg position, and the Trendelenburg tampon cannula in place, the usual incision was made and the larynx divided. The left side of the larynx was entirely healthy, the growth being confined to the opposite side. The irritation of the mucous membrane was allayed by the use of a 10 per cent. solution of cocaine. On the right side of the neck there were many infiltrated glands, which necessitated the removal of a part of the muscles of the larynx proper. In order to facilitate thorough removal of the diseased structure, an additional transverse incision was made.

In cutting away the right half of the larynx from the œsophagus, it was discovered that the tumor had invaded the latter. The upper portion of the œsophagus was thereupon removed with the growth, and its cut edges stitched as high up as possible in order to shut off the pharynx from the larynx and trachea.

A small iodized sponge, which had been pushed above the tracheal cannula into the trachea before introducing the tampon cannula, and which entirely filled its lumen, was left in place; forty-eight hours later it was removed.

The after-treatment of the case was somewhat annoying, owing to the occurrence of a necrosis of the fascia on the right side of the larynx; on this account it was somewhat over two weeks before the tracheal cannula could be removed. A laryngeal fistula resulted which had to be closed by a secondary operation in November. At that time, Dr. Meyer said, when he re-opened the wound in the trachea, he was surprised to see how much the trachea had become flattened; it was compressed from both sides, as we see it in our operations for goitre; probably from the pressure of the cannula. Up to one week ago the patient was in very good condition. Since then the patient complains of considerable dyspnœa, particularly when he becomes excited or upon exertion. On inspiration the left remaining side of the larynx is drawn downward. This the speaker thought was perhaps caused by suction from below. A fold of the pharyngeal mucous membrane, running transversely close to the entrance to the larynx, may in part also be responsible for it. It is intended to divide its free border for one-half an inch. The man's voice is excellent.

Dr. Meyer said that in any future case of this kind he would follow the suggestion made by Dr. Keen, and either dispense entirely with a preliminary tracheotomy or else close the tracheal wound immediately. If the cannula must remain in place, it ought to be removed as soon as possible.

DR. CURTIS said he was at a loss to understand the occurrence of the dyspnœa in the case shown by Dr. Meyer. The speaker said that in one of his cases there was considerable dyspnœa, which was traced to a fold of mucous membrane within the larynx; he thereupon re-opened the larynx and did a plastic operation upon this fold; subsequent to this the patient was entirely free from dyspnœa, and obtained an excellent voice.

## OSTEOPLASTIC AMPUTATION OF THE ARM.

DR. MEYER presented a man, fifty-nine years old, who had been operated upon twice in another city for an epithelioma of the left forearm, which had recurred. When Dr. Meyer first

saw him, there was an ulcerating neoplasm on the dorsal aspect of the forearm, and five weeks ago he removed the arm just above the elbow by Bier's osteoplastic method, which consists, essentially, in covering the end of the amputated bone with a bone-flap, over which the skin-flaps are sutured. In this case Dr. Meyer removed a bone-flap from the humerus, sawing it convexly downward and leaving it attached to the periosteum; then, instead of dividing the humerus in a straight line, he sawed through it in a curved direction, so that the bone-flap fitted it snugly. A saw, which he had designed for these operations last summer, worked very well. The instrument was presented before the Society. Great difficulty was found in handling the periosteum on account of its extreme thinness and delicacy. The glands in the axilla were removed at a second sitting.

The wound healed without any drawback, and the man now has an excellent stump, which is entirely painless to pressure. An X-ray picture taken subsequent to the operation shows that the bone-flap has moved somewhat from its original position, but still seals the marrow-cavity.

DR. CHARLES L. GIBSON said that he had never had occasion to adopt the osteoplastic flap method of amputation described by Dr. Meyer, nor was he fully persuaded as to its advantages. He asked whether the method had ever been utilized to prevent the formation of a conical stump in young children. In such cases it might possibly be of real value; although the usually accepted etiological factors would seem to preclude such a result.

DR. ROBERT H. M. DAWBARN said the Bier method of amputation did not entirely appeal to him. A good periosteal flap, if it lives, will accomplish the same results, namely, it will seal the lacunæ of the severed bone and prevent pressure effects. Instead, in any amputation, of stripping back the periosteum with the usual blunt periosteal elevator, Dr. Dawbarn said he has for a long time used a strong sharp scalpel, scraping vigorously with it. By this method the periosteum is certain to live, however thin it may be. It does not have its circulation interfered with at all. The bone to be deprived of periosteum and the scalpel edge alone suffer. In a leg amputation, for instance, he makes his periosteal flap entirely from the front, and begins stripping it up at once, at the same level as the skin incision; and *not* as a separate layer of periosteum alone.

DR. F. KAMMERER said he did not quite agree with Dr. Dawbarn. Bier's method of amputating the lower extremity gives a beautiful stump; a better one, the speaker said, than he had been able to obtain by other methods. Whether the method was particularly indicated in amputations of the upper extremity he did not know, but in the lower extremity, where the stump should bear the weight of the body, Bier's modification has a distinct and decided advantage.

DR. DAWBARN said he could not ask for more satisfactory results than he has obtained by the method which he had described, namely, scraping up the periosteum with a stout scalpel and then rounding the edge of the bone with a coarse file. With the periosteum utilized as a part of the flap, we get a strong stump upon which the weight of the body is borne without pain.

As regards the mooted question of using a periosteal flap, Dr. Dawbarn said it has one distinct advantage, and that is, if the patient should develop a mild form of sepsis during the first twenty-four or forty-eight hours, the periosteum will have probably adhered by then, and sealed the end of the bone; and thus there will be less danger of an ascending osteomyelitis.

DR. MEYER said that Bier had shown that the so-called painful stump is due to the fact that the marrow-cavity has not been sealed, unless, of course, neuromata are causing neuralgic attacks. This fact, the speaker said, had induced him to resort to the osteoplastic method. Whether it is superior to the periosteal flap method advocated by Dr. Dawbarn could readily be demonstrated by a practical test,—comparing two cases which have been treated by these different methods. Dr. Meyer said he was firmly convinced that with the osteoplastic method the resulting stump is entirely painless, while he was rather inclined to doubt that a periosteal flap would produce sufficient new bone to accomplish the same purpose. Bier has published a number of instances where the bony flap was merely covered with skin, and still the stump was entirely painless, when the patients walked with it, uncovered, on a stone pavement. Dr. Meyer said he thought the osteoplastic method of amputating was preferable in all cases, excepting in senile or diabetic gangrene.

## THE STERILIZATION OF SHARP KNIVES.

DR. CHARLES N. DOWD read a paper with the above title.

DR. DAWBARN said that during the past four or five years he has kept his needles immersed in a saturated solution of chemically pure washing soda in cold water, and believes he was the first to do this. This prevents the needles from rusting and does not dull them. The ordinary commercial washing soda should not be used for this purpose; it contains some half a dozen salts beside the carbonate of sodium, and one of them is the chloride of sodium; and such impure sodium carbonate quickly causes rusting. The following is a quotation from Montserrat's book on "Surgical Technics," published in 1898: "Soda solution for boiling instruments should be half an ounce to the pint. By its use, rust is altogether avoided and sharpness of knives and scissors is unimpaired. The most resistant spores apparently cannot withstand a two-minute boiling, and the ordinary pyogenic micro-organisms are killed in ten seconds." Now, the strength herein advocated is about five times what is customary with us, which is 1 per cent. of soda for boiling instruments. Perhaps, therefore, more soda would mean less dulling.

Dr. Dawbarn said that formerly he avoided boiling his knives for a longer period than a minute or so, lest the temper of the metal be injured. He had recently learned, however, from a metallurgical chemist, that the temper of steel could not be affected by the temperature of boiling water; and that it takes a much greater degree of heat to do this; consequently, Dr. Dawbarn now boils knives, scissors, and needles with the other instruments.

DR. ALEXANDER B. JOHNSON said that in sterilizing instruments by boiling in soda solution, a sufficiently strong solution should be used, at least 5 per cent. or stronger. Even if the ordinary commercial soda carbonate is employed, the instruments will not rust if a very strong solution is made. In his office, Dr. Johnson said, he keeps his instruments immersed in a 5 per cent. soda solution for days, boiling them every time they have been used. Knives become dulled by boiling in soda solution. They preserve their edge better when laid flat upon a piece of gauze than when they are wrapped up in cotton, which must afterwards be pulled off.

Dr. Johnson said he sharpens his own knives, having taken lessons from a professional knife-sharpener. He uses a stone which is first made sterile by boiling, and employs lubrichondrin as a lubricant. As the knives are quite slippery when they are taken out of the soda solution, they should either be wiped on a piece of sterile gauze while they are hot or after they have been dipped into alcohol.

DR. GEORGE WOOLSEY said that for many years, at Bellevue Hospital, he has sterilized his knives in the flame of an alcohol lamp, which does not in any way injure the temper of the steel. Knives thus sterilized are decidedly sharper than those boiled in soda solution.

### ECTOPIC PREGNANCY.

DR. JOHN F. ERDMANN reported a case of ruptured tubal pregnancy and showed the fresh specimen. The patient was twenty years old, who, after skipping one menstrual period, was seized with an attack of pain in the lower abdomen, followed by syncope and subsequently by well-marked symptoms of peritonitis.

Upon opening the abdomen, Dr. Erdmann found the abdominal cavity filled with a large quantity of clotted blood. The hæmorrhage was traced to a rupture of the tube resulting from a tubal pregnancy. The rupture, which was in the tube only, was situated about an inch and one-half from the distal extremity of the tube. In the specimen shown, the foetal sac was still intact, and was practically about one-third from the fimbriated extremity of the tube. The villousities covering the embryonal membrane were adherent to the visceral and pelvic parietal peritoneum; evidently a case of positive tubo-abdominal abortion.

### ANEURISM OF THE AORTA ABDOMINALIS.

DR. OTTO G. T. KILIANI presented an autopsy specimen with the following history: A man fifty years old, was admitted to the medical side of the hospital last September. Up to the onset of his present illness he had always enjoyed good health; syphilis denied. Upon his admission, he complained of sharp pains in the epigastric region after eating. He had lost about twenty-five pounds in the last few weeks. He was kept under observation for a week, and then dismissed without any satisfactory diagnosis

being made. About a week ago he was re-admitted, and in narcosis a tumor was felt in the epigastric region, partly under the left border of the ribs, corresponding to the position of the stomach. Test meal was not conclusive to cancer. Upon opening the abdominal cavity, the stomach presented itself perfectly normal, with the exception that it showed, near the middle of the small curvature, a small tumor of about the size of a large pea, which was considered as metastatic carcinoma. Behind and a little above the stomach there was found a tumor of the size of a fist, which gave the impression of a malignant tumor of the pancreas. Examining the tumor for the possibilities of extirpation, a distinct expansive pulsation could be felt. Nevertheless, the diagnosis of aneurism was not made, the pulsation felt being mistaken for a conducted pulsation. The supposed tumor of the pancreas being tightly adherent to the aorta by former peritonitic processes, including liver, spleen, kidney, and pancreas, an extirpation was deemed impossible, and the wound closed. The patient died on the third day of oedema of the lungs, and showed in the autopsy a luetic aneurism of the aorta, covered by the tightly adherent pancreas. The small tumor of the stomach mentioned above, which helped to induce me to address the affection as carcinoma, proved to be a fibromyoma of the wall.

## PAPILLOMA OF THE BLADDER.

DR. SAMUEL ALEXANDER presented a specimen obtained from a man, forty-two years old, who was admitted to Bellevue Hospital on December 20, 1900, complaining of hæmaturia and interrupted urination. He stated that four weeks previous to his admission he had had a severe attack of renal colic, which lasted two hours; the pain was very intense and stopped suddenly. The first urine passed after this attack contained blood. Previous to this attack there was no history of hæmaturia. The patient was advised at a dispensary to go home and remain in bed; he did so, and on the first day the bleeding ceased. Four days later he resumed his work as a peddler, and the hæmorrhage immediately recurred. He again went to bed, and the bleeding ceased as before. Since then the hæmaturia has recurred from time to time, but it was never of a very severe type. During his second attack of hæmaturia he first noticed an interruption in the stream of urine.



Dr. Alexander said that when the patient was admitted to the hospital and gave the above history, the case was regarded as one of stone in the kidney. Upon palpation, the left kidney appeared to be normal; the right rectus muscle was rigid, and the right kidney seemed to be either displaced or enlarged. Pressure over the pelvis of the right kidney elicited pain, which extended down along the course of the ureter. The bladder was easily able to hold six or eight ounces of fluid, and upon distention there was no bleeding. Upon washing the bladder with two injections, the fluid last injected returned absolutely clear. This apparently excluded the bladder as the source of the hæmaturia. With the searcher the mucous membrane on the right side of the bladder was found to be decidedly roughened. No stone was found and the examination did not excite bleeding. The urine contained epithelial and granular casts, considerable pus, and a little blood. The symptoms thus far elicited strengthened the original view that the case was one of renal calculus. Before operating, however, it was decided to make a cystoscopic examination. This revealed a mass about the size of a man's thumb springing from the base of the trigone. It was removed through a suprapubic incision, and proved to be a villous papilloma.

Dr. Alexander said that in closing the suprapubic wound he followed the method suggested by Dr. Charles L. Gibson, namely, to invert the mucous membrane. In cases of secondary operation, where a suprapubic opening has already been made, the method is apt to prove difficult on account of the adhesions, but in primary cases it is a most perfect method of securing dry suprapubic drainage.

# TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

*Stated Meeting, October 1, 1900.*

The President, DE FOREST WILLARD, M.D., in the Chair.

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## DISLOCATIONS OF THE TOES.

DR. GWILYM G. DAVIS reported the following case: Miss A., aged thirty-six years, rather stout, while jumping from a carriage to the ground felt a pain in the forward portion of her right foot. She thought she had sprained it, and kept off her foot for a few days, and then began walking about, though it still pained her. Her physician examined the foot, but could discover nothing but a sprain. Walking continued painful, and eleven weeks after the reception of the injury she consulted Dr. Davis. On a casual examination there appeared to be little except a tenderness to pressure on the metatarsophalangeal joint of the middle toe of the right foot. On more careful examination it was seen that when the foot was placed on the ground the affected toe was separated from the adjacent ones by a slightly greater space than appeared natural or when it was off the ground. On feeling for the head of the metatarsal bone in the sole of the foot it felt a trifle, but only a trifle, more prominent than the others. On following down the metatarsal bone on the dorsum of the foot the region of the phalangeal joint did not appear so clearly outlined as did those on each side; there seemed deeper sulcus at this point than there ought to have been. Pain on pressure was most marked over the head of the metatarsal bone in the sole of the foot. There was no apparent shortening of the toe. These signs and symptoms were such as to cause him to form the opinion that a dislocation was the cause of the trouble, and this diagnosis was confirmed by the X-ray.

The character of the injury having been ascertained, attempts

at reduction were made, but proved so painful that cocaine was injected, and by forced manipulation the toe was brought into place. It was found impossible, however, to keep the toe in place, so ether was administered, and the extensor tendon, that seemed to be the main agent in causing the dislocation to recur, was divided and the phalanx again replaced.

A plantar splint was applied with a pad extending as far forward as the heads of the metatarsal bones. The affected toe was then flexed firmly over this pad and bound down with adhesive plaster to the splint beneath. The toe was kept in this position for about a week and then the splint was removed, and the patient began walking. In about ten days she stated that the toe was again out of place. She resumed her occupation as nurse, and while she at times had some pain, still, it was not sufficient to cause her to lay up, and she soon afterwards left the country.

Dr. Davis added that he felt sure that both an ordinary fracture and sprain at the end of eleven weeks would be practically recovered from, and that the persistent disability was due to a displacement of some sort which was still present, for in cases of sprains, and of small joint dislocations which have been properly reduced, almost or quite perfect function is restored in a comparatively short time if use is made of the injured member. This is seen in the injuries to the finger-joints so common in ball-players. In fractures, also, union in fair position is usually followed by quick restoration of function.

As to treatment, the case shows that old dislocations of the toes are just as unsatisfactory to treat as old dislocations of the larger joints; also that in some cases, at least, it is almost impossible to prevent the dislocation from recurring, and that simple division of the extensor tendon and replacement are not sufficient.

The question of treatment still remains to be solved. Should another case of as long standing as the present one present itself for treatment, he would be inclined to adopt the following course: Etherize the patient, lay open the joint from above, divide the capsule freely, and also one or both tendons, so as to replace the luxated phalanx into position, and leave it there resting loosely in place without any muscular or ligamentous attachments which might tend to displace it. That this would produce a stiff joint is

not likely, if suppuration was avoided and use of the part early resorted to. If it was desired at all hazards to surely relieve the patient at once of his disability, he would amputate the toe and not attempt a resection. Resection of these joints, done usually on the fourth toe for metatarsalgia, has not been altogether satisfactory; control over the toe is lost, and sometimes it overrides its neighbors and gets rubbed by the shoe; while at others it gets caught beneath them and becomes very painful; in either case it becomes a nuisance which may demand removal. This is the experience of Dr. Thomas G. Morton, who has said that he now prefers amputation to resection for cases of metatarsalgia.

### OPERATION IN THE PREPERFORATIVE STAGE OF TYPHOID.

DR. ROBERT G. LE CONTE detailed the history of a colored man, aged twenty-three years, who was admitted to the Pennsylvania Hospital, December 23, 1896. He had been well and at work until three days previous to admission, when he began to have pain in the pit of his stomach, with constipation of his bowels and loss of appetite. The pain soon shifted to the right iliac region and became very severe and constant. He had chilly sensations with fever, but no vomiting, headache, epistaxis, or pain in the back, and none of the prodromic symptoms of typhoid fever. On admission, temperature was  $102\frac{2}{6}^{\circ}$  F.; pulse, 88; respiration, 20. Tongue heavily coated all over, not tremulous. Specific ulcer on the left arch of the palate. Heart, lungs, and urine negative. The abdomen was distended and tympanitic; the right abdominal muscles much more rigid than the left; exquisite tenderness over the iliac fossa, with a small, easily palpable tumor which was dull on percussion. No enlargement of the spleen was demonstrable.

With the above symptoms and a history of sudden onset, a diagnosis of appendicitis was made, and immediate operation advised. The patient was etherized, and the abdomen opened over the tumor to the outer side of the semilunar line. Serous fluid with flakes of lymph immediately escaped. The last six or eight inches of the ileum were sharply bent on itself and glued together with recent adhesions. These adhesions were broken up, and this portion of the ileum with the cæcum and part of the ascending colon were delivered through the wound. This portion of

the bowel was highly inflamed, deeply congested, and covered with lymph. On washing away the lymph, some six or seven spots were seen, about the size and shape of a small olive, purple in color, with bluish-black necrotic centres. These necrotic areas were on the cæcum and ascending colon as well as on the ileum, and were on the portion of the bowel opposite to the mesenteric attachment. They were unquestionably necrotic Peyer's patches that had ulcerated through to the peritoneum. The appendix was normal except for its peritoneal coat, which had become infected from the neighboring inflammation. It was evident at a glance that if the bowel was returned in such a condition perforation would speedily take place and peritonitis and death follow.

Three methods of procedure presented themselves: (1) Invaginating the necrotic areas with sutures. This was not attempted for fear the sutures would not hold in such a diseased state of the intestine, and if they did hold, that stricture of the gut would result. (2) A resection of the damaged area, some eight inches of the ileum, the cæcum, and part of the ascending colon. This was rejected, owing to the patient's condition not warranting such a radical procedure. (3) Packing off with gauze this area of the intestine from the general abdominal cavity. This was done, and at the same time the appendix was amputated, on account of its damaged peritoneal coat and the fear that it might cause further trouble. Two sutures were placed in the upper angle of the wound, while the ends of the gauze packing filled up the rest of the incision. The temperature following operation was normal, but it speedily rose to  $104\frac{1}{5}^{\circ}$  F. The pulse, however, was of good character, and at no time exceeded 120. Thirty-six hours later very offensive pus and fæcal material were discharged from the wound. Ten days later the fæces began to lessen in amount, and within four weeks of the operation the fistula had entirely closed. In the mean time the patient developed a typical typhoid condition. His tongue became tremulous; the edges cleaned off, sordes developed, mental hebetude appeared, emaciation was rapid, the bowels were loose, and tympany persisted. The blood was twice subjected to the Widal test, and responded both times. The temperature for twenty days varied from  $101^{\circ}$  to  $103^{\circ}$ , when it gradually dropped to normal, and then became slightly subnormal. From this time on the convalescence was uneventful, and he rapidly gained the weight he

had lost. He was discharged from the hospital in good health fifty days after admission.

Dr. Le Conte called attention to the early date at which perforation may occur in typhoid fever, and also to the fact that in anomalous cases of enteric fever the diagnosis from appendicitis cannot always be made.

DR. G. G. DAVIS remarked that the case was so close to one of perforation as to be practically one of perforation. It furnished data as to how long a patient may be in recovering, provided packing is resorted to and a fæcal fistula ensues. There is no doubt that in some of these cases there is not time to perform an ideal operation, in other words, to close the perforation; the chances of the patient's recovery will be enhanced by treating the case as did Dr. Le Conte,—isolating the infected area and draining rather than invaginating and suturing. He believed it to be a fact that typhoid-fever patients stand operation very much better than is usually supposed or than one might expect. If surgeons resort to operation as readily as some advise, attempting the diagnosis of the preperforative stage, no doubt they will operate occasionally and not find a perforation. He had done so in one case. He reported three cases in the *University Medical Magazine* a few months ago, and in one of them there was no perforation found; yet that patient improved very markedly. There was some evidence of peritonitis, and the operation appeared to benefit the patient very markedly. Therefore, even if one does not find a perforation, the operation will probably be of benefit to the patient.

### SHOT AS A NUCLEUS OF VESICAL CALCULUS.

DR. ROBERT G. LE CONTE said that a man, twenty-six years of age, was admitted to the Methodist Hospital, April 26, 1896, with the history that while rabbit shooting, four and a half years previous to admission (November, 1891), his companion's gun was accidentally discharged, and he received most of the charge in his left thigh and hip. Two days later he passed fourteen shot with his urine. As a result of the injury, he was in bed five weeks. He was then perfectly well for nearly four years, when he began to have frequent urination, with some pain across the abdomen and in the pelvis. Gradually the symptoms of stone developed, *i.e.*, pain referred to the end of the penis, pain on

jarring motions, blood at the end of urination, sudden stoppage of the stream, etc. The passage of a sound revealed a small movable stone. Two days after admission, the patient was etherized and litholapaxy performed. A shot, about No. 6 size, came away with the washings from the bladder. The fragments of stone collected weighed 120 grains. The patient returned home on the third day, relieved from all symptoms.

DR. GEORGE G. ROSS mentioned the case of a young man, eighteen years of age, who, having symptoms of stone, was subjected to litholapaxy, and in withdrawing the small crusher a piece of leather shoe-string encrusted with small particles of stone was found in its jaws. It was thought that all the stone had been removed. He, however, redeveloped symptoms of stone, and was operated on again through the perineum, and seventeen inches of shoe-string were removed.

DR. W. G. PORTER said that some years ago he removed a stone from the bladder of a man, the nucleus of which was a twig of a tree. The patient's story was that he had a stricture of the urethra, for which he was occasionally required to use a catheter. On one occasion, when away from home in the wilderness, beyond the reach of a doctor and without a catheter, he was suddenly seized with retention of urine. He cut off a twig from a tree, smoothed it down with his knife, and succeeded in passing it into his bladder. When he withdrew it the urine followed it; and he thought at the time that a portion of the twig was broken off and remained in his bladder. Soon after symptoms of stone appeared; and at the time of the operation he had a very tight urethral stricture, which had to be relieved before the stone was removed by litholapaxy.

#### PERFORATION OF THE SMALL INTESTINE RESULTING FROM THE KICK OF A GUN

DR. WILLIAM J. TAYLOR related that on Saturday, July 28, 1900, a young man of twenty-three was out shooting, using an ordinary double-barrelled shot-gun. This gun was accidentally discharged while he was holding it in front of his body, so that he received a very severe kick from it in the right iliac region. There was intense pain, and he had great difficulty in getting back to his home. Pain and tenderness continued all the next day, and on Monday, the 30th, he was brought to Philadelphia, arriving here

at eight o'clock in the evening, after a journey of five hours. Dr. Taylor saw him immediately on his arrival, and found him to be suffering from general peritonitis, with special pain and tenderness in the right iliac fossa. His temperature was  $102^{\circ}$  F., his expression anxious, but his pulse fairly good. Within an hour thereafter the abdomen was opened. There was general peritonitis, with masses of lymph here and there over the intestine. Two coils of small intestine were glued together at one small point. This was separated very easily with the finger, no force at all being used, when immediately there was a gush of liquid fæces, and a perforation was seen in the wall of the bowel about the size of a lead-pencil, with ragged, sloughing edges. The lymph from the intestine was carefully wiped off, and there was such gaseous distention that the contents of the gut were milked out of this perforation. The opening in the bowel was invaginated and closed by a double row of silk sutures. A search was now made for the appendix, which was discovered to be post-cæcal and very difficult to find. Its tip was slightly clubbed, and, in view of the possibility of subsequent danger, it was removed. A very careful toilet of the péritoneum was made and a search for further perforations or evidence of ulceration in either the large or small intestine. None, however, could be found, nor any evidence of thickening of the intestinal wall. Drainage was introduced, a wick of gauze wrapped in rubber dam.

He gave a history of not having felt very well for some two or three weeks, and, to eliminate the possibility of his having had a walking typhoid, some of his blood was sent to the city bacteriologist for examination by Widal's method, but a negative report was made. He was profoundly poisoned by the septic peritonitis, and, in spite of every effort made to save him, he died seven days after the receipt of his injury.

DR. RICHARD HARTE said that this case emphasized the importance of dealing surgically with severe contusions of the abdomen. He was convinced that the results would be much better in dealing with these injuries if the abdominal cavity were opened, in properly selected cases. In four cases of abdominal contusions which had been admitted to the Episcopal Hospital within a short time, in two there were ruptures of the liver and in two ruptures of the intestine, one of which was very much of the same character as the case cited by Dr. Taylor. A man while attempting



to escape from a falling beam fell, and the point of a pair of pliers which he had in his pocket struck the abdomen and made a small puncture, but did not enter the bowel. There was evidence of abdominal contusion. Dr. Deaver opened the abdomen and found a perforation of the bowel, simply by contact with this blunt instrument.

In determining when the abdomen should be opened, he thought that a man's surgical sense had to be relied on to a great extent. There is a class of cases where the element of shock is very noticeable and where the reaction is slow. There is evidently some disturbance going on which demands surgical interference. These cases, if left to themselves, will soon become tympanitic and present all the symptoms of traumatic peritonitis, and will in a short time die; but if they had been opened immediately, and if possible before the shock had become too profound, conditions would be found in many of the cases which could have been dealt with surgically. Of course, there are cases where surgical interference will be of no avail, as in case of rupture of the liver or some of the abdominal viscera; but where there is hæmorrhage, or where the intestine is ruptured, as so often occurs, with or without extravasations of its contents, most favorable results can be obtained in dealing with these cases by opening the abdomen and seeking systematically for the trouble; and the element of risk involved by this procedure in doubtful cases is slight compared with the old method of dealing with these cases.

### ENTERORRHAPHY.

DR. M. J. O'HARA, JR., presented a specimen that showed an end-to-end anastomosis done after the method he presented at the April meeting. This specimen was removed from a large Newfoundland dog fifteen days after operation; it shows the character of the union obtained, and also the appearance of the gut on the inside. The sutures used on one aspect was the Halstead, on the other a continuous Lembert. His preference was the Halstead, as with this suture he got better approximation and no adhesions to the surrounding structures. The specimen was preserved in Pick's solution. This dog was up and around hunting for something to eat in eight hours; he was fed at once on ordinary dog food, and did not seem to mind the operation in the least. In placing his sutures, he had endeavored to carry them

down to the mucous coat, so that if any hæmorrhage occurred it must be within the bowel. None of the cases that he had observed had any bleeding from the bowel. The operation by his method was a perfectly bloodless one. The larger blood-vessels in the mesentery may cause some annoyance, but wherever it could be done he avoided cutting them.

## WOUND OF THE DIAPHRAGM AND STOMACH.

DR. DE FOREST WILLARD read the history of a boy, two and one-half years of age, who fell from a second story window, striking upon a sharp picket fence, and remained fixed upon the paling until removed by his father; the paling was not broken. A large lacerated wound was found in the left upper quadrant of the abdomen, and several feet of intestines immediately protruded from the wound. No injury of the intestines being discoverable, they were returned to the abdomen, and three stitches were inserted by the attending physician in order to retain them in position during the transit of forty miles to the Presbyterian Hospital. The symptoms of shock steadily progressed, so that by the time the reporter saw the child, some five hours after the accident, the pulse was flickering and feeble, and the respiration rapid. His desperate condition was evidenced by the fact that it was possible to operate upon so young a child without an anæsthetic, and with very little complaint of pain.

Upon cutting the stitches, an irregularly horseshoe-shaped tear, four to five inches in length, was found in the abdominal wall, with its base towards the ribs. The intestines immediately protruded. The wound was enlarged with scissors, when it was found that the stomach and a large portion of the intestines had passed into the pleural cavity through a large tear in the diaphragm, readily admitting the entire hand. When the stomach was drawn down, a lacerated wound, one and one-half inches in length, was discovered upon its anterior wall, which was quickly closed with Lembert's sutures and packed off. As there was a large quantity of blood in the pleural cavity, a long probe was passed through the diaphragmatic wound across the pleural cavity, and a large drainage opening made in the posterior part of the thorax, into which a large tube was inserted. The wound in the diaphragm was closed with catgut sutures; the abdomen

was flushed with hot salt solution, and gauze packing introduced around the stomach and in the wound.

Although the child was in a desperate condition at the beginning of the operation, all the manipulations were completed and the child placed in bed; but he sank steadily, and died from the shock.

From the direction taken by the paling, it is probable that the heart itself was badly contused by the point. At the autopsy it was found that the rent in the stomach and diaphragm had both been tightly closed by the sutures, and had not the shock of the accident been sufficient to kill the child, his chances for recovery would have been favorable. The left lung had collapsed.

# TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY.

*Stated Meeting, January 4, 1901.*

The President, CHRISTIAN FENGER, M.D., in the Chair.

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## THE MORRISON OPERATION FOR THE ESTABLISHMENT OF COLLATERAL CIRCULATION IN CIRRHOSIS OF THE LIVER.

DR. L. L. McARTHUR presented a patient upon whom he had done this operation. The man had been a hard drinker of distilled liquors for years, and ultimately developed the characteristic hobnail liver of the alcoholic. On the 1st of October of the past year patient began to have abdominal pains and noticed abdominal enlargement. On the 23d of October he was admitted to the Michael Reese Hospital with an abdominal effusion of large amount. With the history, the diagnosis of ascites incident to the alcoholic liver was easy. The usual medical treatment was followed out for this ailment, with an effort to get rid of the effusion, but in vain. The abdomen was tapped soon after the admission of the patient to the hospital, and a large quantity of ascitic fluid was removed,—fourteen quarts. The fluid reaccumulated, and in the course of eight weeks he was tapped three times. After the last tapping, which was done the last week in November, the abdomen began to fill so rapidly as to produce great difficulty in breathing. Patient was transferred to the surgical department. On December 3 Dr. McArthur did the operation. It was undoubtedly devised by Morrison and Drummond, English surgeons, who did the first four operations, and Morrison was the first to do it successfully. It is true that the eighth operation of this kind was done by Talma, and he was first to urge systematic use of it. He believes, however, that the operation should be properly called Morrison's operation. This operation establishes

anastomosis between the vessels of the mesentery of the omentum and the parietal abdominal wall, in that way relieving the portal congestion. The method recommended is to denude the parietal peritoneum of its epithelial layer covering the upper surface of the liver, the surface of the spleen, and the surface against which the omentum might be brought in contact with readily for suture. In the early cases operated upon it was found a disadvantage to establish too large an area of adhesions; and it is now considered best to make an anastomosis only between the vessels of the omentum and the anterior parietal wall. This is best done by rubbing the parietal peritoneum vigorously with dry sterile gauze, but not enough to make it bleed, except perhaps in points. He hardly thinks scarification is necessary. The omentum is sutured to the surface which has been rubbed, first measuring the surface to be rubbed with the omentum, to see that it will fit that area; then the omentum is stitched with interrupted fine silk sutures, making in this patient four stitches on each side of the median line. Made through-and-through stitches to close the wound, also picking up the surface of the median line of the omentum as they were pulled together. It has been the experience of former operators that it is necessary in perhaps one-half of the cases to tap the patient once or twice after the operation because of the recurrence of the effusion prior to the establishment of the collateral circulation. In this particular case he feared that this would be necessary about the ninth day, because the abdomen began to distend (after having been emptied) to such an extent that there was great traction on the stitches. On the tenth day there was less tension in the abdominal wall, and from that time to the present there has been a steady retraction in the size of the abdomen, so that in three weeks the patient has lost eleven inches at the greatest circumference. Patient expressed himself as feeling much more comfortable. He sleeps soundly at night; eats well; his color has improved very decidedly from an icteric hue to that of a fair complexion. Patient ready to be discharged from the hospital.

Dr. McArthur stated that a very excellent *résumé* of the literature on this subject was recently published in the *American Journal of the Medical Sciences* by Frasier, who reported the fourteenth case.

The patient became stupid and semicomatose about the

twelfth day, with some elevation of temperature, for which the speaker could find no surgical explanation. The wound looked all right. There was primary union, no stitch abscess, and no redness of the skin about the wound; and in the absence of any other explanation he believes that the elevation of temperature may have been due to the passage of food products into the general circulation.

He had not seen anything in the literature as to the condition of the urine after operation. He had had tests made in this particular case, and found that peptones appeared in the patient's urine, which were not present prior to the operation. It may be they pass from the general circulation out through the kidney. They are present in small amount, and it requires delicate testing to determine their presence. He thinks it would be interesting in future cases to watch the influence of the operation upon excretion.

Frasier recommends that the operation be done in the majority of cases under cocaine, inasmuch as these patients stand a general anæsthetic badly. Dr. McArthur believes that this would be a wise suggestion to follow. Had he seen the article in time, he would have tried cocaine anæsthesia, as he feared to give the patient a general anæsthetic.

DR. M. L. HARRIS stated that he had operated in February, 1900, on a man, fifty-four years of age, who had been a very heavy drinker of whiskey. He had had ascites for some time, and his physician had been tapping him on an average of every six days for some months, removing from eleven to twelve quarts of fluid at each tapping. The patient came from Western Iowa, and, on arriving at the hospital, was extremely weak and exhausted from his trip and his condition. He was unusually icteric; the abdomen was greatly distended, so that respiration was extremely difficult. He operated on him the day after his arrival. Before operating, he studied carefully the experiments of Tillman and others who have worked out experimentally the production of adhesions between the omentum and parietal wall, the object being to determine in what manner the largest venous trunks could be produced in the least possible time. The experiments of these gentlemen seem to demonstrate that the larger vessels could be produced more quickly if the peritoneum were removed, so that the omentum was brought directly in contact

with the subperitoneal tissue. Following this suggestion, he removed the parietal peritoneum in his patient over an extensive area in the anterior abdominal wall by scraping it with a scalpel. He scraped it until the peritoneum was thoroughly removed and good fresh bleeding occurred; then he stitched the omentum over the entire area so as to bring as large a surface in contact with the denuded portion as possible. The omentum in this case was very much thickened and extremely vascular, it having the appearance of a surface which seemed to be covered with little granulations from the marked expansion present in the blood-vessels. Patient progressed favorably after the operation. He was obliged to tap him on the fourth day on account of a reaccumulation of fluid, removing several quarts. After this the fluid recurred more slowly, and patient was tapped again on the ninth day after the first tapping, or the thirteenth day after the operation, four quarts of fluid being removed. The third week after operation he left for home. As to the subsequent history of the case, the fluid gradually disappeared, and no more tapings were necessary. The jaundice which the patient had entirely disappeared, and he was able to get about in very good condition. In April, about eight weeks after the operation, he died suddenly. At the autopsy, cerebral hæmorrhage was found as the cause of death, the hæmorrhage having taken place into the ventricles of the brain. Inspection of the abdomen showed the omentum had developed very firm adhesions at the point where the peritoneum had been denuded and sutures had been used. The vessels were quite large and were already well developed.

DR. MCARTHUR reiterated the cautions of avoiding indiscriminate operations. Of the fourteen cases that have been reported, only eight of them practically were for the trouble for which Morrison and Drummond recommended the operation. The operation should not be done when all liver substance is gone and bile is not being secreted for the stools. No operation should be done when the renal functions are very faulty, so as to render it unwarranted. The operation should not be done for carcinomatous disease producing obstruction to the portal circulation unless it is only palliative, so as not to throw discredit on the operation itself.

Talma's operation was done on a boy, nine years of age, for an ascites of unknown origin associated with a nephritis.

The nephritis yielded readily to treatment, but, the ascites persisting, he operated and found some tubercular peritonitis, stitched the omentum to the abdominal wall, and the ascites was relieved.

### HIP-JOINT DISEASE TREATED BY INCISION AND INJECTION WITH PURE CARBOLIC ACID.

DR. M. L. HARRIS presented a boy, seven years of age, who was admitted to the Children's Hospital, August 10, 1900, and discharged December 30. When admitted, he was greatly emaciated, having hectic fever, pain, and the characteristic deformity of hip-joint trouble. There was a large abscess filling the left hip-joint and extending beneath the tensor vaginæ femoris muscle almost to the knee. He was operated on August 29, the joint opened, and the tubercular focus, found on the upper surface of the neck and inner surface of the great trochanter, removed with the curette. The joint was filled with pus and tuberculous granulations, which were removed with the curette. The abscess, extending down the thigh, was opened in the same way, and posteriorly where an abscess had dissected backward. The joint was filled with pure carbolic acid (95 per cent.), and allowed to remain one minute, when it was removed and alcohol used, as recommended by Phelps, of New York. All the cavities were filled in the same manner, and washed out with alcohol and dried thoroughly with gauze. A large drainage tube was used, and the wounds packed with gauze. A long anterior Thomas splint and plaster to fix the joint were used. Improvement was rapid; the cavities closed up, and the joint is now well.

Dr. Harris presented a second patient, a boy, nine years of age, who was admitted to the hospital July 9, and operated upon July 15. The case was essentially the same as the first one. The joint was opened, the tuberculous focus found on the upper surface of the neck extending into the joint, and was thoroughly removed with the curette. The joint was filled with carbolic acid, and washed with alcohol in the same manner as in the first case, a large drainage tube being introduced, the joint packed, the wound dressed in the same manner with Thomas splint, and the boy is now running around.

Dr. Harris mentioned three more cases in the hospital which he had treated in the manner described, but they had been oper-



ated upon so recently that they were not well enough to be presented. In both the cases presented excellent motion in the joint was preserved.

DR. L. L. McARTHUR stated that in large abscesses about the hip-joint, presenting the classical symptoms of hip-joint disease, the great temptation has been to make the classical incision down into the joint at once. The conservative surgeon should explore any sinus or abscess cavities that may be associated with apparent hip-joint disease, and see whether the tubercular focus lies in the fossa within the greater trochanter, or whether it be a tuberculosis of the margin of the acetabulum, for in 2 or 3 per cent. of the cases the hip-joint may be spared if these early operations be done, not incising the joint, but curetting the diseased area, which will be found in a number of cases to be outside the joint. He has twice cut into joints without finding disease, but found the disease either in the greater trochanter or on the margin of the acetabulum; remembering that fact, he has called attention to it in his last term of service at his clinics in St. Luke's Hospital. In a typical hip-joint case he found tuberculosis of the margin of the acetabulum, but not involving the joint, thus obviating the need of opening the capsule.

DR. HARRIS said that he had not used this treatment in any case of primary synovial tuberculosis. He has used it in five cases of hip-joint trouble and in two of tuberculosis of the elbow-joints. In all cases he had to deal with primary osteal tuberculosis.

In regard to the incisions for the removal of the capsule, the capsule is not dissected out; and it is not the intention to do so in this method. The tuberculous sequestra are removed always by means of the curette, and no bone is sacrificed except the tuberculous area. The interior of the joint is curetted, so that the granulations may be removed and the joint cavity filled with carbolic acid.

Replying to a question, he stated that scars, after the healing of tuberculous wounds, are always red and present the characteristic appearance of these scars for some time. Furthermore, tuberculosis, when once lodged in bone, probably never entirely disappears. He has no doubt but that there is tuberculosis still in both of the cases, but, so long as there are no clinical manifestations of the disease, the patients are said to be cured. The

disease may remain dormant for a number of years and then develop again.

The point brought out by Dr. McArthur of following up sinuses he agrees with; and in one of his cases, in which there was a large extra-articular abscess, it was opened first, and the abscess tract followed up until it was determined where it led to. It extended to the upper surface of the neck and from there into the joint. It is wise advice to follow sinuses, at present, to see if the joint is involved, rather than open into the joint and then find out whether it is involved or not.

### CONGENITAL ANGIOMA OF THE TONGUE.

DR. JACOB FRANK presented a man, seventy-one years of age, a carpenter, with a very large congenital angioma of the tongue. The patient had a large swelling on the side of the neck, and on palpating the tonsil it was found to be hard. The case was presented in order to elicit the opinions of the members relative to operation. The patient had a systolic murmur. If a child is presented with an angioma of the tongue, should an operation be done for the removal of the tumor? Considering that this man had lived seventy-one years with this tumor of the tongue, he would be loath to advise an operation unless it began to grow rapidly.

### SURGERY OF THE TENDONS.

DR. F. S. COOLIDGE read a paper on "Some New Points in Tendon Surgery," for which see page 582.

DR. E. J. SENN stated that regeneration takes place more from the tendon-sheath than it does either from the distal or proximal portion of the divided tendon. The sheath is as important as the periosteum in bone structure.

Dr. Senn referred to Goldthwaite's method, which he did not consider new, but which corresponded very closely to Tillaux's and other methods. Very little stress needs to be laid on the method of performing the anastomosis. When the surgery of nerve structures is considered, it requires much more accurate suturing, and much more care must be exercised not to injure the structures. It is different in tendon surgery on account of the capacity of the tendons to regenerate. If the tendon-sheath is important as regards proliferation, the surgeon should be careful to preserve this sheath as much as possible. In doing these opera-

tions, after cutting the tendon he tries to slit up the tendon-sheath, then do the anastomosis, suturing the tendon-sheath over the anastomosis, in this way replacing normal structure wherever such a procedure can be done.

He referred to a contribution by Townsend, recently published, in which reference is made to a number of Eastern surgeons who have had great success in operating for various deformities, particularly for drop-wrist,—the operation simply consisting of doubling up the extensor communis digitorum, in that way correcting the drop-wrist. Gibney had reported permanent results from this method. He looks upon this operation with a great deal of suspicion. It is simply shortening the tendon in a case of well-marked drop-wrist. Drop-wrist is not due to a lengthening of the tendon unless it has existed for many years; but it is also due to a certain amount of paralysis of the muscle itself.

Quite a number of cases of anastomosis between the flexor and extensor tendons have been reported by Rochet, as well as one or two by Townsend. The operations of uniting the extensor tendon to a corresponding flexor tendon, or *vice versa*, have been followed by good results.

The cases of spastic paralysis on which Dr. Coolidge had operated were very important, and probably more of this work will open up a greater field. He had had no experience in such cases.

DR. CARL BECK said that he had operated on three cases of infantile paralysis, transplanting the tendons of active muscles into the tendons of inactive muscles. The method which he used in two cases was to tunnel the ligament, and, attaching the active tendon without cutting the inactive in one, cutting it in the other case where he operated on both legs at the same time. He had not published the results of these cases because he was awaiting the final results. The results immediately after the operation are always good; but if the cases are observed for a year or two, one could form a more accurate idea as to the permanency of the results. In one case the result was practically *nil*, although he carefully sutured the tendons, but they must have given way. In the other two cases the condition has materially improved. One boy is walking about without braces, the operation having been done a year and a half ago. Formerly, he made some ex-

periments in cases of infantile paralysis by getting the limb perfectly stiff in removing the surfaces of joints, doing the operation known as arthrodesis. He exhibited a patient before the Chicago Medical Society upon whom he did this operation, and the girl, who previously had never been able to walk without crutches, walked into the Society without them. The knee-joint surface was scraped off and the limb made stiff in the knee.

The essayist did not mention the application of this method of transplantation of the tendons in cases where the tendon has been lost by exfoliation in suppurating tendon. Dr. Beck had made an experiment on a case, transplanting an active tendon from the dorsal into the palmar side. He has observed marked improvement in motion.

DR. M. L. HARRIS called attention to a method of tendon suturing which he published in 1882. The difficulty in uniting tendons by suture is due to the readiness with which the suture in passing through the end of the tendon tears out, owing to the facility with which the longitudinal fibres separate. In experimenting on this subject, he devised a procedure by which the tension of the suture comes transversely and simply passes through, and this depends upon the strength with which the fibres are held together longitudinally to prevent the suture cutting out.

DR. JACOB FRANK said that in uniting tendons it is his rule to split the tendon and leave it lax to avoid tension. At first, he was in doubt whether the tendons would contract so as to be of any value, but to his surprise he found them in perfect functional order. He does not think any method of suture of a tendon should be practised that will produce tension.

### CARCINOMA OF THE RECTUM.

DR. L. L. MCARTHUR said that some years ago he presented a paper before the Chicago Gynæcological Society in which he recommended extirpation of the lower part of the rectum for carcinoma, whether it involved the sphincter or not, by an incision through the posterior vaginal wall. This method meets the cases in the female very satisfactorily in the majority of instances, but once in a while a carcinoma is encountered whose lower border is situated on a level with the tip of the cervix. In such a position this incision is inadequate, and under those cir-

cumstances the much abused Kraske operation can be utilized in many cases.

He passed around a specimen of adenocarcinoma of the rectum which was removed by the Kraske incision without disturbance of the sacrum, and described the Kraske incision, as well as modifications of it.

He presented the specimen because of two or three interesting points in connection with the case. The patient had no idea that she had carcinoma, and consulted her physician, Dr. Evarts, because of a slight laceration of the perineum which had existed for a number of years, and which she desired to have repaired. In making a bimanual examination, a tumor was felt behind the uterus and found to be adenocarcinoma of the rectum. Patient had had constipation, which existed all her life, but to which she had paid very little attention. In removing a carcinoma high up in the rectum, where the peritoneum has to be opened, he urged that a preliminary artificial anus be made. This was done by the muscle-splitting operation. In making this muscle-splitting operation, the patient has a certain degree of control which she does not get if the muscle is cut instead of separated. In doing the operation, a single catgut stitch is taken on each side of the aponeurosis of the external oblique so as to make a rounded edge for constriction of the bowel rather than a sharp cutting edge. He found it an easy matter to make the artificial anus, which was established satisfactorily, and at the end of six days the patient was up, and was going about in a week. Fourteen days after the operation the patient was able to walk around the hospital and to go out-doors, the artificial anus then closed, with primary union by operation.

# INDEX TO SURGICAL PROGRESS.

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## ABDOMEN.

I. The Operative Treatment of Ascites due to Hepatic Cirrhosis by Means of Omental Fixation. By DR. KUSNETZOW (Russia). The author instituted a series of experiments on dogs to find how much influence was exercised on the portal circulation by new-formed adhesions from omental fixation, and how such procedures caused anastomoses between the portal vein and the inferior vena cava.

In his experiments Kusnetzow proceeded as follows: (1) Complete ligation of the peripheral branches of the portal system, (a) the large, (b) the small mesenteric veins, or, (c) several smaller branches of the above at the same time: the *venæ duodenojejunalis* and *gastroduodenalis*, or the *gastroduodenalis* and *mesenterica minor*; (2) ligation of the portal trunk, either complete or partial, *i.e.*, its calibre reduced one-half or one-third.

Each dog was operated on two or three times. At the first operation omental fixation was practised; at the second a mesenteric vein was ligated or the peripheral portion of the portal vein; at the third operation the central portion of the portal vein was ligated, *i.e.*, near the liver. Only one dog out of fifteen died, the rest were killed from one to three months after operation. The author comes to the following conclusions:

(1) Good results follow omental fixation in cases of ascites due to impeded portal circulation.

(2) Talma's operation is preferable to Delagénières.

(3) Complete ligation of the portal vein without preliminary omental fixation is rapidly fatal.

(4) Omental fixation enables animals to withstand double ligation of the portal vein.

(5) Complete ligation of the portal vein below the "gastro-lienalis" causes early death even after a preliminary omental fixation,

(6) After omental fixation, incomplete ligation of the portal vein in its middle section leads to engorgement and temporary diarrhœa, but the animal soon recovers.

(7) The superficial epigastric veins dilate markedly after omental fixation, and more particularly after portal ligation.

(8) The veins of the large omentum dilate and soon communicate with those of the abdominal wall. The route taken is from the portal vein through the "gastrolienalis" (gastro-epiploic) to the omental veins, thence *via* the epigastrics to the femoral, intercostal, or mammary veins.

(9) Direct communication exists and becomes increased between the portal vein and the vena cava by means of a number of small veins. This supports Sappey's views.—*Wratsch*, 1900, Nos. 32 and 33; *Centralblatt für Chirurgie*, 1901, No. 4.

## II. Surgical Pathology of the Omentum and Mesentery.

By PROF. PAUL L. FRIEDRICH (Leipzig). Friedrich observed last year, in three cases, a transitory icterus follow herniotomy in middle-aged men. In each case much omentum was resected. Von Eiselsberg has noticed ulceration of the stomach following omental resection and even extensive ligations in the mesorectum, which he attributes to extensive thrombosis which reaches the gastric arteries.

Friedrich undertook an experimental investigation, hoping to explain the above phenomena. In guinea-pig excision of the omentum, or ligation of omental vessels, even when the area operated on was very small (*e.g.*, one-third to two-thirds of the omentum), was followed by multiple simple anæmic and hæmorrhagic necroses of the liver. In a not inconsiderable number of

cases where the ligations were close to the epiploic artery, one or more ulcers appeared in the stomach. According to the time which elapsed between the operation and the obduction the gastric lesions consisted in hæmorrhages in the mucosa, epithelial necrosis, and distinct ulcers. The ulcers usually were located in the territory supplied by the inferior epiploic artery.—*Archiv für klinische Chirurgie*, Band lxi, 998.

JOHN F. BINNIE (Kansas City).



## REVIEWS OF BOOKS.

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INTERNATIONAL CLINICS. Vols. III and IV. Tenth Series, 1900 and 1901. Philadelphia: J. B. Lippincott Company, 1900 and 1901.

Vol. iii opens with a paper by Dr. F. C. Valentine on aseptic urethral instrumentation. Although this article deals only with asepsis in genito-urinary work, still, the principles presented are of general surgical importance. We particularly commend the following to the consideration of surgeons who lay especial emphasis upon the cleansing of the subungual spaces: "Surgically clean hands are unobtainable when a subungual space is allowed to remain." The Gordian knot is cut in eliminating the subungual space by cutting the finger-nails. The author describes for the benefit of the general practitioner how surgically clean urethral instruments may be secured. He strips the subject of all superfluities, and simply and clearly tells how it is done.

A chapter on extragenital chancres, being a clinical lecture delivered at the New York Skin and Cancer Hospital by Dr. L. D. Bulkley, is good and instructive. It is really a plea for removing syphilis from the category of venereal diseases. The author shows the close relation between syphilis and skin disease, and reports a surprisingly large percentage of extragenital syphilitic infections. Hear what he says: "Of the ordinary run of skin cases seen in clinics and in private practice, syphilis is the cause in over 10 per cent. In other words, over 10 per cent. of the skin cases that come annually to this hospital, to the New York Hospital, and that I see in private practice, are due to syphilis, and number about 2400. Of this 10 per cent., or 2400

cases, extragenital chancre on the finger, lips, etc., is present in no less than 113. Fournier states that, in his judgment, 25 per cent. of these cases of syphilis are acquired innocently, and that in 25 per cent. of these cases there have been no sexual transgressions."

A defect of this system of reporting clinics is found in this: "Here are some of Jonathan Hutchinson's wonderful plates showing a form of inoculable syphilis which is not often seen in this country, etc;" but we look in vain for Jonathan Hutchinson's wonderful plates, for the chapter is without illustrations.

A chapter on the treatment of soft chancres, being a clinical lecture delivered at the St. Louis Hospital, Paris, by Alfred Fournier, briefly covers this subject. Dr. Bransford Lewis describes a new ureter cystoscope.

In a clinical lecture on syphilis, Dr. W. S. Gottheil introduces what may be regarded as an innovation, or at least a deviation from the accepted methods of diagnosis. We offer no criticism, excepting the statement that this method is not wholly without advantages. The patient being presented, this is what he says: "I shall ask no questions in regard to the patient's history until after we have made a diagnosis of the condition. This is a point upon which I cannot insist too strenuously in all dermatological and venereal cases; we are not compelled to draw deductions from obscure physical signs and symptoms that admit of various interpretations. The lesion lies open before us for examination by sight and touch, and even for microscopic investigation, should that be necessary. That should be sufficient for us; besides, the history, even if honest, may be incorrect or misleading. After we have come to a decision we may, for our own satisfaction, inquire into it; but it can only confirm our conclusions or leave them as they were."

Dr. Willy Meyer presents a case of gastrostomy and a case of cholecystectomy. Dr. W. L. Rodman's remarks on cases of bony ankylosis of the knee are reported. Dr. Robert T. Morris's

breezy style is displayed in reports upon cases of appendicitis, gall-stones, and harelip. Interesting and instructive reports are also presented of Dr. Howard Lilienthal's observations upon a series of cases involving the surgery of the urinary apparatus.

One of the most valuable features in this book is a chapter by W. C. Krauss on the use and care of the microscope. This is valuable because users of the microscope need instruction on just this subject.

Vol. iv contains a chapter on symmetrical gangrene, by Dr. Douglas Graham, which is of more than ordinary interest because it elucidates clearly and briefly the etiology of the disease, and shows particularly how it may be recognized in the pre-gangrenous stage, and, indeed, how the gangrene may be prevented.

Dr. Alexandre Renault, of the Broca Hospital, Paris, has a clinical lecture on the treatment of chronic gonorrhœa. Dr. James Pedersen presents a chapter on the treatment of urethritis, in which he argues not for a rapidity but for a certainty of the cure.

Dr. James J. Walsh is the author of a valuable chapter on the recent advances in diagnosis. Cytodiagnosis and cryoscopy are among the most important of these. The value of phloridzin for determining the permeability of the kidneys is discussed.

This volume also contains reports of Dr. Deaver's clinics at the German Hospital. These are all good and instructive.

Several pages in this book are given to the remarks of Professor Roncali, of Rome, who argues for the parasitic origin of cancer, and illustrates his blastomycetes with a colored engraving. The professor has seen something in carcinomatous tissue which he does not understand, and, like many others, he has seized upon it as the etiological factor. We have grown accustomed to the discovering of these etiological factors. We observe, however, that Virchow, Orth, Hanseemann, and Birch-Hirschfeld have not seen these things. The alleged parasite described by this author seems to be the same thing as that hit

upon by Foà and Soudakewitch, and which presents the appearances of a cell in the process of colloid degeneration.

The final section of this book is given to a digest of the etiology and accepted pathology of all of the more common diseases. It constitutes a sort of compend or work of ready reference. It will be seen that these volumes contain a vast amount of practical information.

JAMES P. WARBASSE.

AN AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY; under the general editorial charge of GEORGE M. GOULD, M.D. Surgical Volume. Philadelphia: W. B. Saunders & Co., 1901.

It was recently remarked in our hearing, "Physicians, as a rule, are reading too many journals and few or none of the books which are piled upon their shelves." There seems to be no difficulty in finding a reason for this. It is largely due to the almost invariably great size and weight of the volumes which embody the standard medical and surgical literature of the day. This enormity prevents ready handling. It discourages him who would read in the carriage or railroad car. It exiles the work from a snug corner in an already well-filled satchel. It quickly wearies the muscles of the upper extremities and back unless the volume rests upon a desk or table. In short, it prevents the busy doctor from reading standard literature during most or all of the time which he can devote to it, and converts many a valuable library, endowed with costly and inestimable information, into an infrequent resort for brief moments of reference. All this is said without intending to imply that the value of many worthy current monthlies and weeklies is underestimated. The object is, rather, to emphasize our approval of the publication of the "American Year-Book" in two volumes, both somewhat smaller than the average medical book (although too large). This is distinctively a work designed for reference reading; yet it was

the first of recent works of magnitude to be published in volumes of moderate size. It is hoped that publishers of standard works will follow this example, making volumes smaller, even at the expense of multiplication.

Of the issues of the "Year-Book" for this year and the last, the surgical volumes are before us. In reading the current issue we find many features of excellence. Few points deserve unfavorable comment. It should be noted here that the tasks of the various editors are not easy. To report a technical or theoretical article with words enough to make its ideas clear and without undue elaboration is difficult. To do this several hundred times is arduous. The present volume contains several novel ideas regarding suture materials and their preparation, and a thorough review of a year's reports on anæsthesia, including the early work with spinal analgesia. An amazing amount of literature concerning interscapulothoracic amputation is collected. Instructive reports of cases of tetanus treated by intracerebral injections of antitoxin are cited. Modifications of old forms of new-growths are reported. Several new methods of treating inoperable malignant tumors are suggested, and operative measures more or less radical are discussed. There are twenty-four pages devoted to the surgery of the stomach and œsophagus,—concise summaries of many articles representing much advanced operative work and investigation,—exceedingly valuable to any one interested in abdominal surgery. The balance of the consideration of this subject occupies over seventy pages. In no single work can one by perusing so few pages gain so clear and comprehensive an appreciation of the extent of the abdominal work accomplished during the past year. It gives a gratifying view of the great scientific progress made along this line in the United States. The brevity of the space devoted to fractures would suggest a dearth of literature on this subject. The section on genito-urinary surgery seems comprehensive. A few pages treating of radiography display its limitations, various novel uses, errors in deduction, and some of the recorded untoward effects.

The editor of this work rightly considers obstetrics as a branch of surgery. Here are grouped reviews of some finely detailed accounts, presenting unusual features of pregnancy, parturition, and the puerperium, experiences with which are necessarily few. But little of value is recorded of placenta prævia, ectopic gestation, or abortion. The gynæcologist's review seems inflated, but evidences care in preparation, and tells of much excellent work. Several handsome full-page plates embellish it.

From the point of view of the general worker the pages concerning the recent literature of otology, ophthalmology, rhinology, and laryngology are satisfactory. Each reviewer seems to exhibit the tendency to consider largely the surgical aspect of his specialty.

Gross anatomy seems to progress chiefly in the direction of discovering anomalies of structure, according to this work. There is a page of the anatomical section devoted to reviews of several interesting articles on the minute anatomy of the nervous system.

Altogether, this volume is a good general index to surgical progress, especially useful to the man who is too busy, professionally or otherwise, to read largely of new standard works or of current journalistic literature. Such books are not essential in the library of the scholar. But he is a rare type—even in our profession—in this commercial age, and especially in a land where commercial success, often necessarily, is the first great aim.

CHARLES H. GOODRICH.

## NOTICE.

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### TO THE MEDICAL PROFESSION OF THE UNITED STATES.

THE undersigned constitute a Committee similar to those formed in several European countries for the purpose of receiving subscriptions for a monument commemorative of the distinguished scientific services of Professor Leopold Ollier. Among the members of these Committees are Lord Lister, Professors von Bergmann, Czerny, Durante, and other leading men. The municipality of the city of Lyons has dedicated an open space adjacent to quarters of the various academic faculties on the border of the Rhone, and named it in his honor "Place Leopold Ollier."

The Profession of this country are well aware of the great services rendered by Professor Ollier, especially in the domain of plastic and osseous surgery. His labors have been most fruitful in the domains of surgery, of physiology, and of pathology.

The Committee hopes to raise not less than one thousand dollars (\$1000) as a testimonial from the Profession of America. Checks should be forwarded to W. W. Keen, 1729 Chestnut Street, Philadelphia, Pa., and at as early a date as possible.

ROBERT ABBE, New York,  
WILLIAM T. BULL, New York,  
P. S. CONNER, Cincinnati,  
A. T. CABOT, Boston,  
HOWARD A. KELLY, Baltimore,  
W. W. KEEN, Philadelphia,  
RUDOLPH MATAS, New Orleans,  
WM. J. MAYO, Rochester,  
W. F. McNUTT, San Francisco,  
ROSWELL PARK, Buffalo,  
CLAYTON PARKHILL, Denver,  
MAURICE H. RICHARDSON, Boston,  
NICHOLAS SENN, Chicago,

*Committee.*

# A LOOP AROUND THE HYOID BONE AS AN AID IN NARCOSIS DURING CERTAIN OPERA- TIONS ON THE LOWER JAW AND IN THE MOUTH, AND IN AFTER-TREATMENT.<sup>1</sup>

By CHRISTIAN FENGER, M.D.,

OF CHICAGO.

ABOUT ten years ago I lost a patient after extirpation of one-half of the inferior maxilla, including the whole of the middle portion of the bone, together with the muscles of the floor of the mouth, the operation being rendered necessary by carcinoma. The patient died suddenly during the following night. When seen in the evening, his condition was good; when seen at midnight by the nurse, he was awake and well and went to sleep; about an hour later, the nurse found him dead. No other explanation for this death could be found than asphyxia from the sinking back of the tongue during sleep, the tongue and larynx being deprived of the muscles which connected them with the lower jaw.

As a result of this experience, after resection of one-half of the lower maxilla, I have always allowed a loop of silver wire or silk, passed through the anterior portion of the divided bone, to remain, the ends being brought out through the dressing, so that the nurse or patient might pull on it if dyspnoea should arise. This precaution is sufficient only when the muscles extending from the hyoid bone to the maxilla are intact on one side, and if it can be seen during the operation that the entrance to the larynx is made free by traction on the end of the bone left.

<sup>1</sup> Read before the Section on Anatomy and Surgery of the American Medical Association, 1900.



In case of removal of the floor of the mouth for malignant tumors, when all the muscles from the body of the inferior maxilla backward to the tongue and hyoid bone are removed, the tongue and larynx with the epiglottis have necessarily lost their attachment to the maxilla, and will sink backward against the posterior wall of the pharynx, causing occlusion of the entrance to the larynx and strangulation, especially during sleep.

During narcosis, this difficulty is obviated to a great extent if the tongue can be pulled out of the mouth in a longitudinal direction. This cannot be accomplished when the jaws are closed and fixed, so that the mouth cannot be opened nor access gained to the tongue, as in operations for osseous ankylosis of the jaw.

Further, I have observed that in the Regnoli-Billroth operation; that is, the operation for the removal of the floor of the mouth or tongue through a horseshoe-shaped incision below the maxilla, when the tongue is pulled out of the infra-maxillary opening, not in a longitudinal direction, at right angles to the posterior wall of the pharynx, but in a downward direction, where it forms an acute angle with the frontal plane; under such conditions, when, during narcosis, there is difficulty in maintaining a free entrance to the larynx, this difficulty is best obviated by making traction on the hyoid bone by means of a sharp hook as advised by Kappeler, or by a loop passed around the body of the bone which I have found to be more convenient, and which, after having used for several years in at least a dozen cases and found without danger, I recommend.

The value of this procedure has been demonstrated over and over again during long operations, so that the students in the amphitheatre could easily observe the change from labored and noisy respiration to free and noiseless respiration as soon as traction was made on the loop.

It is impossible for the assistant who gives the anæsthetic to hold a sharp hook around the hyoid bone for a long time, possibly for hours, while he can manage a loop of silk passed

around the hyoid bone just as easily as a loop passed through the tongue. The loop is not needed for an emergency; that is, for an attack of asphyxia during narcosis, where the sharp hook will be sufficient; but it is needed during the entire narcosis, because, as I have seen in these classes of cases, asphyxia supervenes the moment traction on the hyoid bone is released, and is followed by perfectly free respiration when traction is again made.

There is another reason why it is important that the space behind the larynx should not be half obstructed, but be perfectly free with space to spare if possible; namely, because it is impossible to keep the pharynx perfectly free from the frothy mucus. If one-half of the entrance to the larynx be obstructed, the inferior half lying against the wall of the pharynx, there is no space for the mucus, and therefore it must be aspirated down into the larynx, and the air must pass through it and tend to bring it down. On the other hand, if the larynx is perfectly free, and if there is more room behind it than is actually necessary, there will be less aspiration of mucus, and possibly less bronchitis or broncho-pneumonia, following the operation.

In discussing the measures against respiratory troubles caused by the tongue and the epiglottis during anæsthesia, or, rather, while the anæsthetic is being administered, Kappeler<sup>1</sup> stated in 1880 that the following methods are employed:

(1) Howard. Elevation of the thorax to let the head and neck sink backward.

(2) Lifting of the lower jaw, devised by an Englishman (Little (?)), introduced in Germany by Von Eschmarch, and first minutely described by Heiberg.

(3) Pulling out the tongue with tongue-forceps and lifting the epiglottis with the finger (Howard).

Although the manipulation of Howard, namely, elevation of the thorax, and the lifting of the jaw described by Heiberg,

<sup>1</sup>Kappeler: *Anæsthetica*, Deutsche Chirurgie, Billroth and Luecke, Lief. 20, p. 127.

are, as a rule, sufficient during deep narcosis, they are not sufficiently effective during the initial stage of excitation, when there is a spastic retraction of the tongue, and spasm of the muscles of the jaw which often necessitate forcible opening of the mouth with a gag, pulling out of the tongue, and direct lifting of the epiglottis. In alcoholics, who present a protracted stage of excitation and vigorous, obstinate retraction of the tongue, he prefers to pass a loop of silk through the tongue and pull it out with no more injury to the organ than occurs from the use of the tongue-forceps.

In a foot-note on page 127 he mentions the hyoid bone briefly as follows:

"Recently I have succeeded in avoiding the rough manipulation necessary to separate the jaws during the tetanic closure of the mouth, by resorting to an easy and only slightly injurious method; namely, lifting of the hyoid bone forward. I passed a small, strong, pointed hook up behind the middle of the body of the hyoid bone and hooked it into the bone, which was then pulled forward. The tongue and epiglottis followed the hyoid bone in its forward movement, the epiglottis from traction on the hyo-epiglottic ligament.

"I observed without exception that the respiration became free when this manipulation was resorted to during asphyxia in chloroform narcosis, caused by closure of the entrance to the larynx."

To demonstrate the effectiveness of the different manipulations to allow free passage of air into the larynx, Kappeler made experiments on the cadaver, which I have verified and completed as shown by the accompanying figures.

When the calvarium has been removed, as is usually done in post-mortem examinations, and the brain taken out, the whole basilar portion of the occipital bone and the body of the sphenoid as far as the posterior clinoid processes are removed with a chisel and the pharynx opened from above. A clear view can now be obtained of the upper (posterior) surface of the soft palate and the root of the tongue below it. If, in case of small skulls, the view into the pharynx is not sufficiently free,

a portion of the posterior wall of the pharynx, the anterior

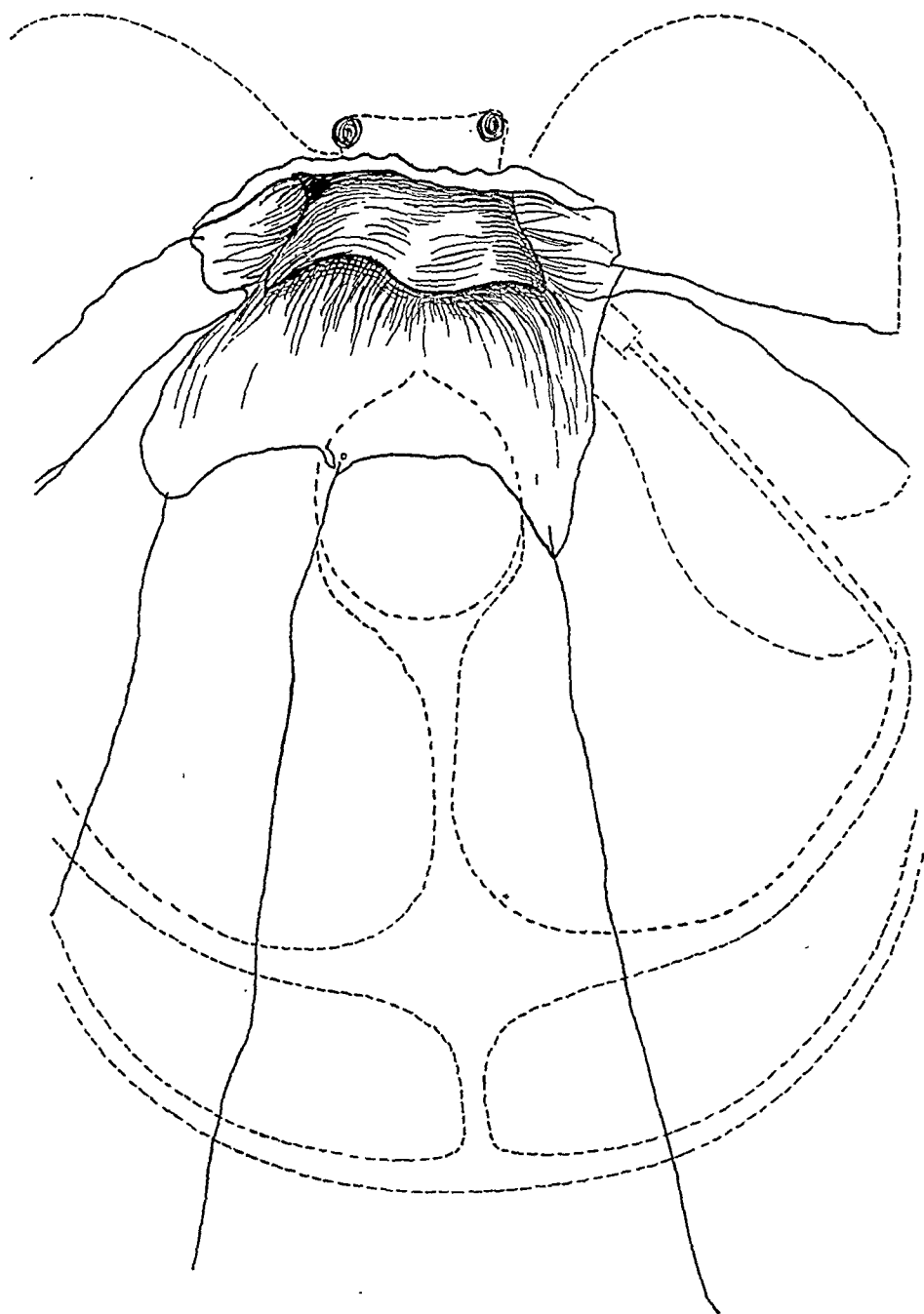


FIG. 1.—Head in horizontal position or on a small pillow.

arch of the atlas, and its odontoid process may be removed.

The head is then placed in a horizontal position or on a small pillow, whereupon the soft palate can be seen lying against the posterior wall of the pharynx, either entirely so or separated

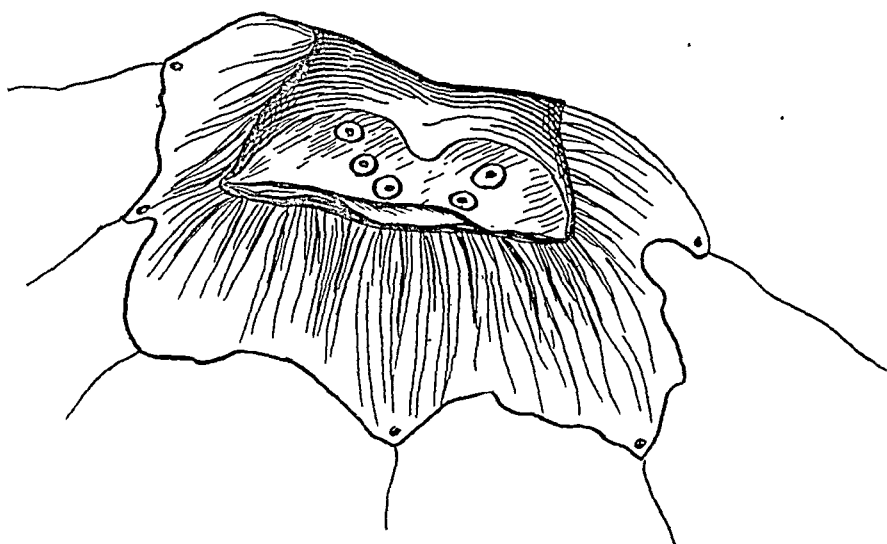


FIG. 2.—Head bent backward by lifting or pulling under the chin; mouth closed.

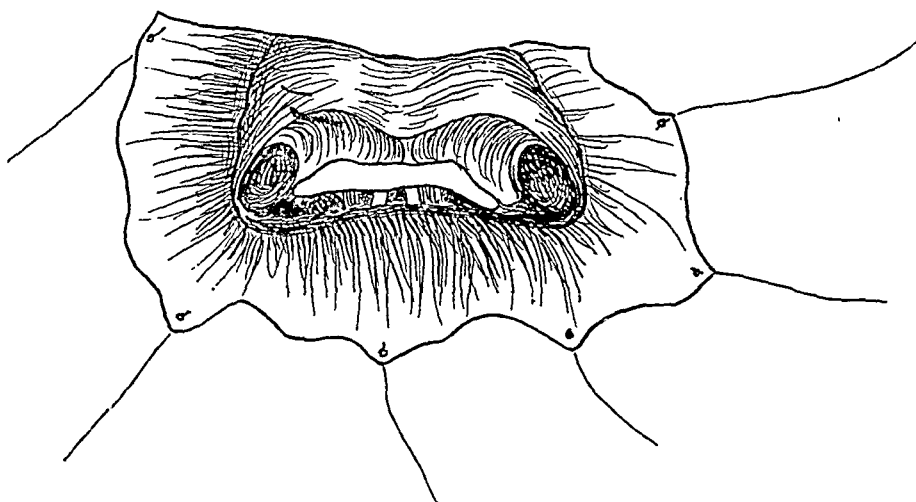


FIG. 3.—Tongue pulled out of the mouth.

from it by a narrow slit through which the upper ridge of the epiglottis may be seen. (Fig. 1.)

If the chin is now lifted up, the mouth being closed, the soft palate moves forward away from the wall of the pharynx,

and we see the root of the tongue and the upper border of the epiglottis; but its whole posterior surface still lies close to the posterior wall of the pharynx. (Fig. 2.)

If the tongue is now pulled forward out of the mouth in front of the teeth, it is seen that the posterior part of the tongue moves forward away from the epiglottis, and the

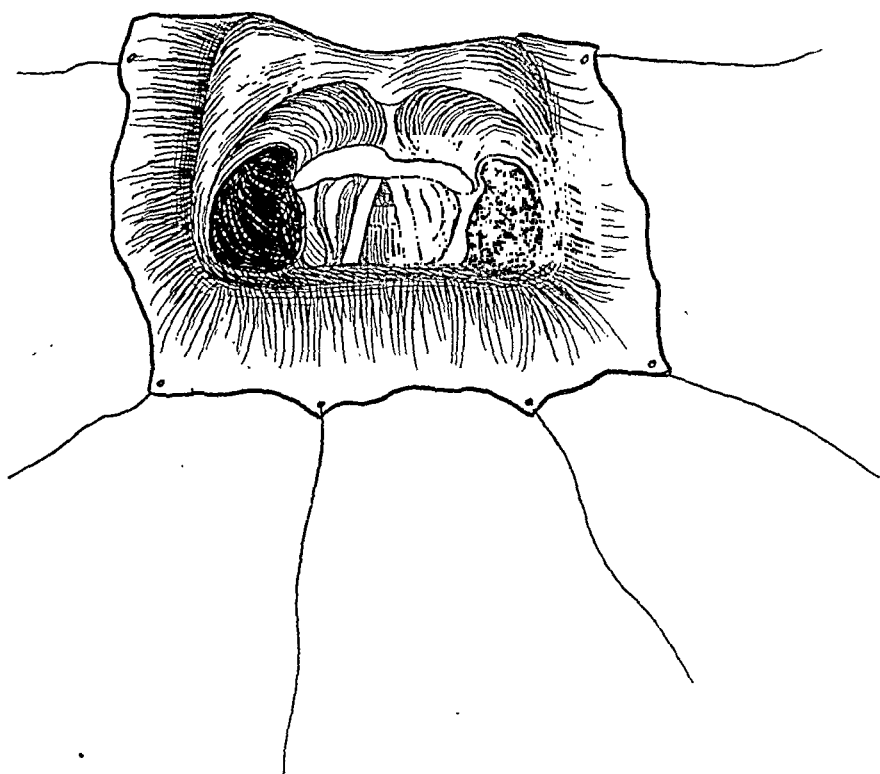


FIG. 4.--Lower jaw (inferior maxilla) lifted forward by pushing the posterior borders of the ascending rami upward when the patient is recumbent, or forward when the patient is in an upright position. If the tongue is pulled now while the jaw is lifted, the epiglottis is moved a little forward almost to a line with the soft palate.

median glosso-epiglottic ligaments come into view, while the epiglottis is either not moved at all or makes only a slight forward movement. (Fig. 3.)

If the lower jaw is now lifted forward by pushing the descending rami upward when the patient is recumbent, or forward when the patient is upright (Howard (?)), the epi-

glottis moves forward, so as to free the entire upper (anterior) half of the entrance to the larynx. (Fig. 4.)

It will thus be seen that this manipulation alone is much more effective than pulling out the tongue. If the tongue is now pulled forward while the jaw is lifted forward, the epiglottis is moved a little forward, but only very little, and not beyond the border of the soft palate.

If the hyoid bone is now pulled forward, either by the sharp hook of Kappeler or by the loop as devised by me, the

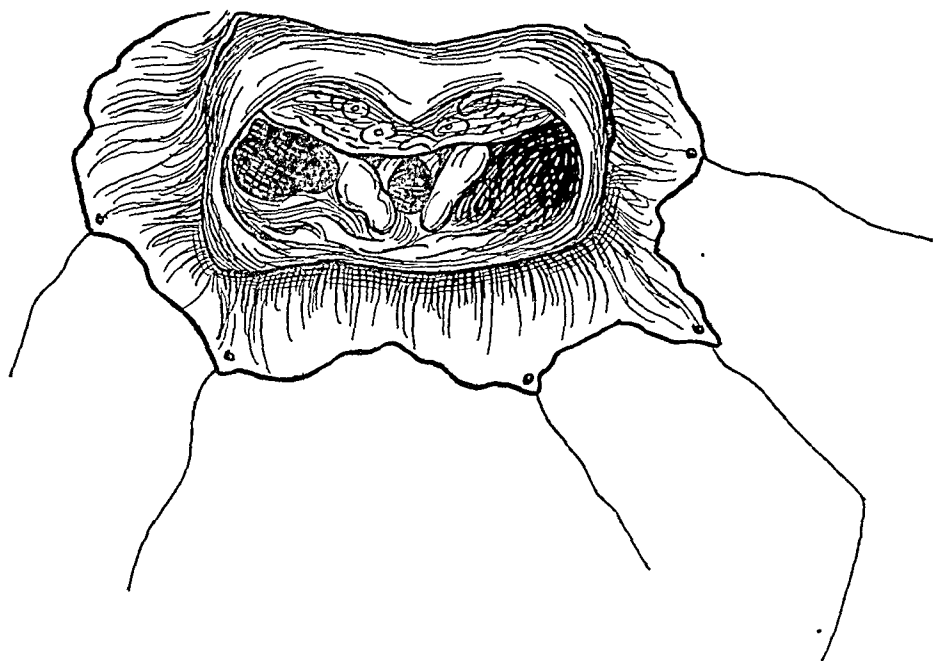


FIG. 5.—Hyoid bone pulled forward. Loop of silk around its body.

mouth closed and the tongue untouched, the posterior (lower) half of the entrance to the larynx is made free, and the anterior (upper) half of the larynx is covered by the root of the tongue, which also covers the epiglottis. (Fig. 5.)

If, in addition to the pulling forward of the hyoid bone, traction is made on the tongue, the whole of the entrance to the larynx is made free. The tongue and epiglottis have disappeared forward under the soft palate. It is really the pulling forward of the hyoid bone that frees the entrance to the

larynx from the wall of the pharynx, with room to spare. (Fig. 6.)

It will be seen from the plates that traction on the hyoid bone is far more effective than any other method, because this is the only manipulation that makes the entire posterior commissure of the larynx with the arytenoid cartilages visible. This it accomplishes by lifting them from the posterior wall of the pharynx. It is, therefore, only by pulling the hyoid

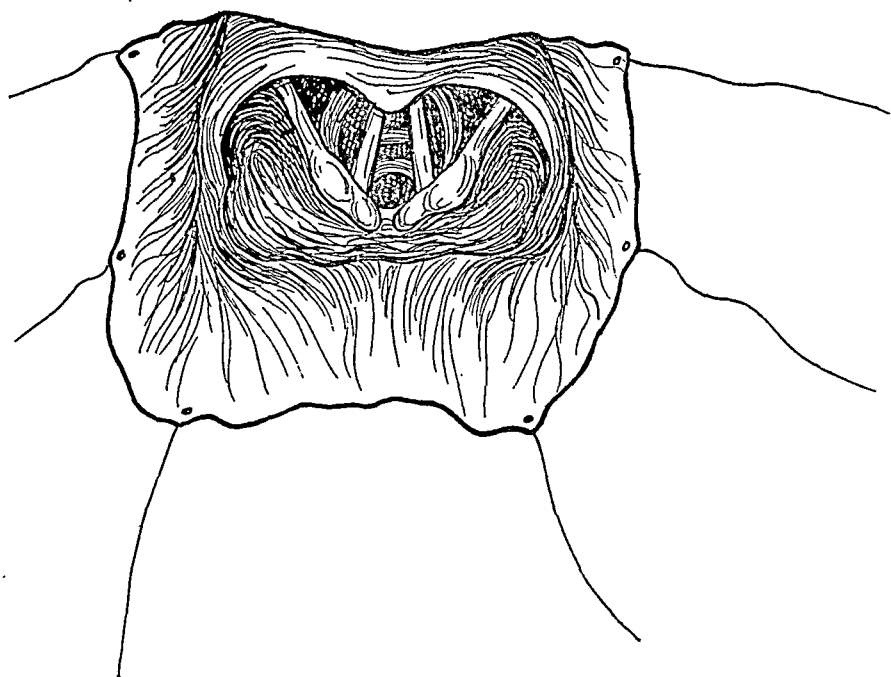


FIG. 6.—Hyoid bone pulled forward and tongue pulled forward.

bone forward that the entire entrance to the larynx is made free.

Through a small longitudinal incision over the middle of the body of the hyoid bone, it is easy, by means of an aneurism-needle, to pass a loop of silk around the posterior surface of the body, up over the upper border, and out through the wound. A small pad of iodoform gauze is packed in the wound and the loop tied over it, the ends being left long enough to permit of manipulation by the operator or anæsthetizer during the operation. At the close of the operation,



the loop is left in place and attached to a plaster-of-Paris cast loosely covering the dressing at the field of operation, with traction on the hyoid bone sufficient to prevent any sinking back of the larynx and epiglottis, and thus to keep the entrance to the larynx open even during sleep. I usually allow the loop to remain for three or four days, until the patient is able to breathe without difficulty with the head and body in any position. It is needless to add that the small wound over the hyoid bone adds nothing to the gravity of the operation.

# EXCISION OF THE INTACT GASSERIAN GANGLION.

WITH A REPORT OF TWO CASES OF TRIFACIAL NEURALGIA SUCCESSFULLY TREATED BY THIS MEANS.<sup>1</sup>

By WILLARD BARTLETT, M.D.,

OF ST. LOUIS.

FALLOPIUS was the first to discover that the fifth cranial nerve is divided into three peripheral portions. It was noted later by Meckel and Vieussens that a certain flattened structure marked the point of division; but it remained for Hirsch to recognize, in 1765, this body as a ganglion, and to it he gave the name "Ganglion Gasserianum," in honor of his noted teacher, J. L. Gasser.

The ganglion was until 1890 numbered among the few bodily structures which had not yet been made the object of the surgeon's endeavors. On April 2 of that year, however, William Rose,<sup>1</sup> as Pickering Pick<sup>2</sup> says, instituted its removal in the treatment of trifacial neuralgia. Two years later, after painstaking investigation, Fedar Krause<sup>3</sup> pointed out the therapeutic indications in intractable cases and advanced a practical operative technique. Of the Altona surgeon, no less an authority than König<sup>4</sup> writes "dann aber gebührt Krause (1892) das Verdienst dieselbe auf grund eingehenden Studiums vertieft und ausgebildet zu haben."

It is not my object in this paper to define trifacial neuralgia nor to classify cases; it is enough for practical purposes to understand that we are called upon to treat a certain number of individuals suffering from so-called "tic-douloureux" of such intensity that all means other than surgical fail to re-

<sup>1</sup> Presented at a meeting of the St. Louis Medical Society on January 5, 1901.

lieve them. In such cases we may interrupt the continuity of the fifth nerve by (*a*) dividing its branches between the ganglion and the skin, by (*b*) cutting the sensory root between the brain and ganglion, or by (*c*) removing the latter. Which course is to be chosen?

(*a*) The peripheral procedures, while of less immediate danger, have proven of very doubtful benefit. Fowler<sup>5</sup> found that recurrence within three years failed in only eight out of fifty-two extensive resections of the second division; while Wagner<sup>6</sup> concludes that but 32 per cent. of all who undergo any sort of superficial operation are permanently cured. (*b*) Section of the sensory root as proposed by Horsley<sup>7</sup> can be scarcely less dangerous than the removal of the ganglion; and besides, if "reasoning by analogy" is permissible here, we could, in view of the resemblance that exists between the Gasserian ganglion and a spinal ganglion, expect no lasting benefit from a division of the root. We were long ago taught, as a result of experiments made by Waller, Bernard, Kahler and Singer, and Muenzer, that the posterior spinal root regenerates from the ganglion towards the cord; while very recently Baer, Dawson, and Marshall<sup>8</sup> demonstrated on seven dogs that the second cervical posterior root became reformed after division with a ligature. (*c*) As a purely anatomical deduction, we have left then but one course, viz., removal of the ganglion, if a permanent cure is to be expected. And, indeed, clinical observations have borne out the truth of such a conclusion. Professor von Hacker<sup>9</sup> was compelled to resort to this procedure in a case, for the relief of which he had performed no less than nine peripheral operations; while Hutchinson<sup>10</sup> goes so far as to say that nerve resection has no place in severe cases. The indications for removal of the ganglion, as classified by Tiffany<sup>11</sup> after a study of 108 cases, are (*a*) the involvement of more than one branch, (*b*) the presence of pain in an area which receives its nerve near the latter's point of exit from the skull, (*c*) paroxysms which are not the expression of constitutional or cerebral disease, (*d*) the failure of all other therapeutic measures.

Different surgeons have undertaken the operation in various ways, some entering the middle cranial fossa from the side, others by cutting an opening through the roof of the zygomatic fossa. In my choice of an operative procedure, I was influenced against the latter route, which is the most direct way to the ganglion, by the fact that so many vessels and other important structures must be encountered before the skull cavity can be opened; it may be further noted that it is hardly possible to completely expose the ganglion and remove it intact by this method. To arrive at such a conclusion one has but to study the proposals of Rose,<sup>12</sup> Doyen,<sup>13</sup> Poirier,<sup>14</sup> Jacob,<sup>15</sup> and that of Quenu and Sebileau, so warmly endorsed by Tichonowitch<sup>16</sup> in his prize essay of recent date.

On the other hand, the high temporal operation devised independently by Hartley<sup>17</sup> and Krause<sup>18</sup> has as its chief drawback frequent and troublesome involvement of the middle meningeal artery; and this is said with full knowledge of the fact that Krause,<sup>19</sup> in answer to the criticism of Tichonowitch,<sup>20</sup> writes that after following his own method twenty-two times, he still considers it better than any other.

I elected Cushing's<sup>21</sup> inferior temporal procedure as eliminating the chief disadvantages possessed by the older temporal and infratemporal methods. Here the main point in the technique is the making of an opening so low in the temporal fossa that the removal of the ganglion can be accomplished without the danger of injury to the middle meningeal artery; a feature which Dollinger<sup>22</sup> has shown to be possible in 94 per cent. of all skulls. Thus preliminary ligation of the external carotid, as practised by Davis<sup>23</sup> and Spellissy<sup>24</sup> in their intracranial operations, is rendered unnecessary.

CASE I.—Mrs. S., sixty years of age, native of Ireland, consulted me in September of 1900 for left-sided trifacial neuralgia; paroxysms of which had rendered life almost unbearable for about seventeen years. At first the temporal and supra-orbital regions only had been affected, but a few years later the area supplied by the second branch became involved; at no time, however, had she experienced pain in that part of the face to which the inferior maxillary nerve is distributed.

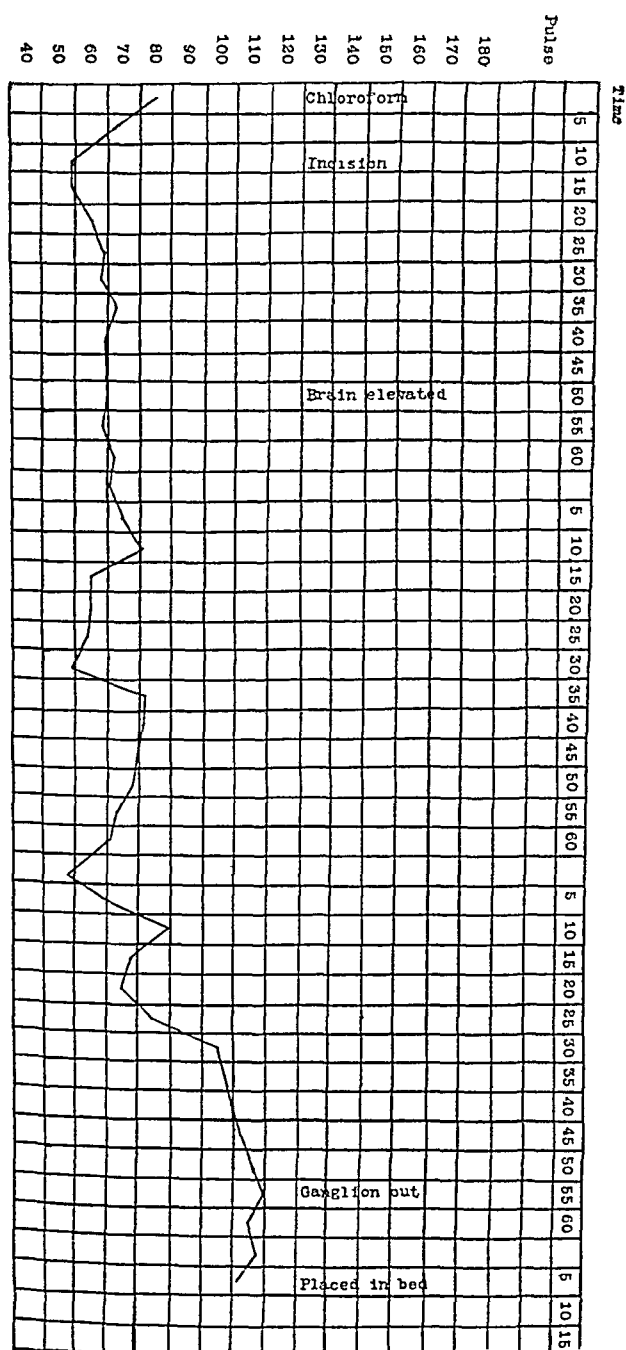
My patient had had a hard fall on the side of the head twenty-two years earlier, a circumstance to which she attributed her malady; and during the past seventeen years had experienced attacks of two weeks' duration, alternating with intervals of about the same length, free from pain. As is so common in these cases, she had submitted, some fifteen years before, to the extraction of all the teeth on the affected side, but without relief. In the fall of 1898 evulsion of the infra-orbital branch was performed, and for a period of ten months she remained free from pain; but at the expiration of this time the agony recommenced in the regions previously affected.

When I first saw her, her sufferings were terrible to witness. Every two or three minutes, a paroxysm, lasting one minute, would seize her, and during these periods tears would stream down her cheeks, while she rocked too and fro, giving vent to moans expressive of feelings which could not be mistaken. When I proposed to her excision of the ganglion and revealed the dangers attendant thereon, she assured me, by way of reply, that she were better off dead than alive, if such torture had to endure.

On October 10, 1900, she was chloroformed at St. Anthony's Hospital, and a horseshoe-shaped incision made; the base of it resting on the zygoma, and its highest limit but little above the helix of the ear. The zygoma was chiselled off at both ends, retracted downward with the soft tissues, and the lower portion of the temporal fossa opened with a chisel and rongeur forceps. The middle meningeal artery was plainly seen crossing the opening, and could be followed to the foramen spinosum, so was not injured. Excessive venous hæmorrhage followed the separation of the dura from the bony floor of the middle cranial fossa, and, to complicate matters, an unusually large bony prominence had to be cut from the floor before the foramen ovale could be exposed.

The dural envelope of the ganglion was attacked at the foramen rotundum and split as far as the foramen ovale, then the superior layer was dissected up, completely exposing the body of the ganglion with its sensory root and three branches. The edges of these structures were freed by blunt dissection and a thin spatula introduced beneath the body of the ganglion, tearing it loose from the underlying portion of its envelope. The ganglion was now grasped in a locking forceps, especially curved to conform to the floor of Meckel's cave; but at this point I departed

from the technique as prescribed by Cushing and cut off the



part of its sensory root, at the same time tearing it from the first branch as Krause<sup>25</sup> advises. I feared to cut the first branch, as I had at no time been able to assure myself of the exact location of the nervus abducens, which I did not care to risk dividing.

Accomplishment of the steps just detailed was most tedious on account of constant and profuse venous hæmorrhage, which necessitated repeated packing and the loss of much time; but having finally assured myself that Meckel's cavity was empty, the soft parts were united with through-and-through silk sutures, a small gauze drain being left because of venous bleeding which could not be entirely checked.

The drain was removed twenty-four hours later, the stitches taken out on the fifth day, the patient sat up on the seventh, walked several blocks on the fifteenth, and travelled a distance of 100 miles to her home on the eighteenth day after operation. She was naturally gratified by the knowledge that an area of tactile, thermic, and pain anæsthesia coincided with the region which the fifth nerve had formerly supplied.

For four weeks after the operation there was complete paralysis of the muscles to which are distributed the third, fourth, and sixth nerves. Three weeks later, she had so far recovered the use of them that the eye was open as widely as its mate, and voluntary movements of the ball in every direction were possible, though a little jerky.

About this time a small superficial ulcer of the cornea appeared, and at the expiration of three weeks' more showed very slight disposition to heal, but had fortunately led to no involvement of deeper structures.

On February 5, 1901, Dr. A. E. Prince, of Springfield, Illinois, informed me that the cornea had been entirely restored.

I draw from this experience the practical conclusion that it is well to protect the eye for a much longer period than is commonly done.

CASE II.—November 26, 1900, I was consulted by Mrs. R., a white woman, aged fifty, American by birth. From notes made at the time I take the following. Patient is in a poor state of nutrition and presents the haggard appearance of one who has been a constant sufferer. She has been for many years a victim of toothache on the right side, which, Bryant<sup>26</sup> writes, is twice as frequently affected by neuralgia as is the other. A part of the

time, the portion of her scalp, which is innervated by the trifacial, has been the seat of darting pains which made her think of flashes of lightning. At times the area supplied by the third branch has been involved, though not to the same degree as have the other two. The teeth on the right side were extracted with temporary benefit, the pain, when it returned, being referred chiefly to the toothless gums. The marked effect of cold, damp weather on this woman's sufferings reminds one in a measure of Spellissy's <sup>27</sup> case of a blacksmith who became suddenly chilled after hard work over his forge, and in whom the disease later assumed so aggravated a form that surgical treatment became necessary.

A singular feature of my patient's affliction was that it was worse every second day; paroxysms being induced by hot or cold drinks, a sudden draught, the jar of a street-car, and the contact of her feet with the pavement in walking. So sensitive to every irritation was the mucous membrane of the mouth, that she had been unable to take solid food for almost two months, and had in consequence become greatly emaciated, as mentioned above. In addition to these physical inroads, the pain had so affected her mental condition that friends had noticed her speech becoming irrational; and, indeed, she could scarcely describe her sensations to me, for, in her own words, "the thoughts would scatter at the very attempt."

On November 27, 1900, the Gasserian ganglion was removed at the Deaconess Hospital, chloroform being the anæsthetic used; the operative technique in every particular resembling that employed in my first case. Hæmorrhage was less in amount and better controlled, consequently this operation was of much shorter duration than the other. This wound was sewn up without a drain; there was no perceptible shock, and the patient made a perfect recovery. On the fourth day the stitches were removed, on the sixth the patient sat up, and on the seventh left the hospital. Later she developed a troublesome suture sinus infection, which, however, resulted in no permanent harm.

Since the operation this woman's aspect has changed completely; the drawn, pained expression has given place to one of repose, and her weight is increasing now that she can eat all kinds of food.

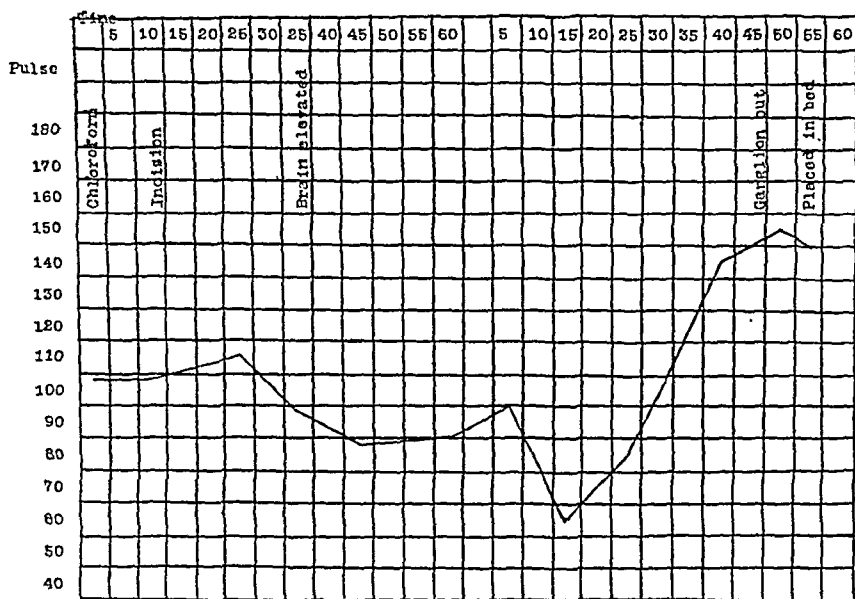
The motor derangement about the eye is identical with that observed in my other patient; but the cornea is intact, and no



evidence of change in any of the special senses has manifested itself.

As in my earlier experience, the perception of tactile, thermic, and pain stimuli is entirely wanting in the skin, to which the trigemini were formerly distributed.

On the 12th of May, 1901, I was informed that the patient's eye had opened of its own accord, during the previous week, for the first time since the operation.



Pulse Chart No. 2. Operation, November 28, 1900.

## DISCUSSION OF OPERATIVE TECHNIQUE AND RESULTS.

*Duration vs. Hæmorrhage.*—My first operation required for its completion a little more than three hours, but my second, something less than two hours; while Krause,<sup>28</sup> with all his experience in this field, took three hours for one case. Poirier<sup>29</sup> claims to have done his own operation in fifteen minutes on the cadaver, and in fifty minutes on the living subject. Indeed, I have carried out Cushing's technique on the cadaver in less than half an hour; still, I must agree with Kocher<sup>30</sup> that the time required for the removal of the ganglion on the cadaver is no criterion for the same on the living, where the control of hæmorrhage must be taken into account.

Among others, Caelho,<sup>31</sup> Mugnai,<sup>32</sup> Krause, and Keen

report cases in which the operation had, on account of profuse hæmorrhage, to be completed at a second sitting; the wound remaining packed for the few days intervening. To avoid this dual procedure, Lexer<sup>33</sup> had a patient brought into the sitting posture, and was thus able to complete an operation in which venous hæmorrhage was so serious that it could not be controlled by plugging the wound.

Just how perplexing and embarrassing this ganglion operation may, under certain circumstances, become, is illustrated by the case of Depage,<sup>34</sup> in which, on uncovering this structure, the meninges were torn, cerebrospinal fluid deluged



FIG. 1.—Ganglion. Case I.

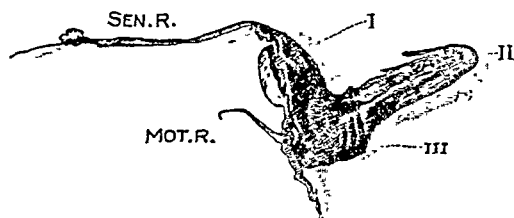


FIG. 2.—Ganglion. Case II.

the field, profuse hæmorrhage commenced, particles of brain substance were lost, and pulse as well as respiration stopped for a time.

It is not without interest to mention in this connection the measures which have been adopted by surgeons who have had the misfortune to tear the middle meningeal artery. Friedrich<sup>35</sup> left a silver probe in the foramen spinosum for two days; Murphy<sup>36</sup> plugged it with catgut, and Lexer,<sup>37</sup> after stuffing this opening with iodoform gauze, allowed the wound to heal over the same.

*Importance of the Intact Anatomical Specimen.*—That I

accomplished my purpose and removed both ganglia intact is, as it seems to me, clearly demonstrated by the accompanying illustrations from photographs.

The practical importance of this point appears to us in its true light when we consider Tiffany's<sup>38</sup> statement, made after reviewing 108 cases, that "recurrence after *known removal* has not yet been reported." That this structure has, however, *not* been completely excised in nearly all cases is shown by Marchant and Herbert,<sup>39</sup> according to whom it was accomplished but fifteen times in ninety-five intracranial attacks on the trigeminus. Cushing lays great stress on the removal of the ganglion sufficiently well preserved that it may be subjected to a microscopical examination; the value of which becomes apparent when it is shown that noted operators have removed from Meckel's fossa structures which were found to contain absolutely no ganglion cells. Keen<sup>40</sup> had such an experience with an endothelioma, and Gerard-Marchant another with a myxomatous growth.

Far from any failure in finding ganglion cells, Tiffany<sup>41</sup> and Monari<sup>42</sup> intentionally left behind that portion of the body which gives rise to its first branch, hoping in this way to avoid corneal ulceration; but the practice has, it seems, fallen deservedly into disuse.

The microscopical examination of my two specimens, kindly made by Dr. Schwab, shows all that can be desired in the way of ganglion cells in both of them.

*The Danger in the Operation.*—The mortality rate has always been rather high in these cases; seventeen of the ninety-five reported by Marchant and Herbert<sup>43</sup> terminated fatally; while in 128 Krause<sup>44</sup> operations the death-rate was 15.6 per cent., as vouched for by the originator of that well-known method. Bryant<sup>45</sup> quotes Tiffany for a mortality of 22.2 per cent. in the 108 cases collected by him in 1896. Carson,<sup>46</sup> with 100 cases, brought Tiffany's table up to the date of his own paper which appeared in 1899; and of these last 100 extirpations, but eleven resulted in death.

*Other Undesirable Effects.*—Temporary paralysis of the

muscles supplied by the motor-oculi and abducens nerves, as occurred in both my cases, often results from pressure of tampon and spatula; and Richardson<sup>47</sup> claims that it is impossible to protect these structures in every case. Among those who report having injured them are Friedrich,<sup>48</sup> Depage,<sup>49</sup> Carson,<sup>50</sup> Lexer,<sup>51</sup> and Cushing,<sup>52</sup> most of them men of wide experience in this field. On the other hand, three cases were reported by Friedrich<sup>53</sup> in which there were no eye symptoms; but in one only had the ganglion been completely removed.

Insensibility of the cornea and permanent decrease in the secretion of tears, as mentioned by Tillmanns,<sup>54</sup> have, in cases operated upon by Keen,<sup>55</sup> Lexer,<sup>56</sup> and others, been productive of a keratitis such as I observed in my first case. In most instances this complication terminated favorably, though Erdmann<sup>57</sup> was forced, in one case, to enucleate the eye in consequence of it. Among other serious manifestations may be mentioned atrophy of the optic nerve, which Gerard-Marchant<sup>58</sup> observed after one of his operations.

Marchant and Herbert noted disturbance in taste, smell, and hearing, while Richardson<sup>59</sup> and Walton, as well as Gutierrez,<sup>60</sup> mention decided impairment of speech in consequence of pressure upon the temporosphenoidal lobe during the operation; all of these sensory phenomena were noticed to some degree by my first patient. In a case reported by Depage,<sup>61</sup> the injury to the brain must have been extensive, as paralysis of one leg and retention of urine supervened.

As a matter of course, the division of the muscles of mastication, which is unavoidable in the temporal operation, leads to unilateral loss of function; but this proves of small consequence, for, as Krause<sup>62</sup> remarks, the patients use in chewing only the opposite side of the mouth, where the sense of taste is unimpaired; equally unimportant is the laming of those muscles which are supplied by the motor portion of the tri-facial. There is, however, sometimes an unusual limitation of the extent to which the mouth can be opened, as a result of

excessive contraction of the scar which is necessarily produced in the substance of the masseter and temporal muscles.

*Permanent Results.*—These have been almost uniformly satisfactory where the operation has been withstood. In one single case reported by Garré,<sup>63</sup> thin nerve strands were demonstrated in the foramina rotundum and ovale one year after supposed complete removal of the ganglion. Friedrich also had a recurrence in the entire area supplied by the trigeminus, and attempts to explain the same by what he calls "peripheral regeneration." In a *résumé* of this most important aspect of the subject, Keen<sup>64</sup> decides that neuralgia of the original intensity recurs in from 1 per cent. to 2 per cent., and that a milder form has returned in 4 per cent. to 5 per cent. of all cases.

As far as my two cases are concerned, the therapeutic results can be portrayed in a few words: both patients experienced violently painful paroxysms shortly before passing under the influence of the anæsthetic, but since awakening from it neither has known one twinge of this most excruciating of all the agonies with which disease racks mankind.

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# THE PATHOLOGY OF TRIGEMINAL NEURALGIA, ILLUSTRATED BY THE MICROSCOPIC EXAM- INATION OF TWO GASSERIAN GANGLIA.<sup>1</sup>

By SIDNEY I. SCHWAB, M.D.,

OF ST. LOUIS, MO.

THE removal of the Gasserian ganglion for persistent trigeminal neuralgia made the study of the pathology of this disease possible. The operation was based upon the assumption, either that the ganglion was the focus of the disease, or that by its removal the central sensory paths for pain would be permanently interrupted. Grounds for this assumption were found both clinically and pathologically.

Previous to this time there were only two sources from which such a study could be approached. First, from the examination of portions of the peripheral branches of the fifth nerve, which were removed by the so-called palliative operations; and, secondly, from hypotheses and conjectures based upon the pathology of neuralgias elsewhere. The first of these offers only a limited field for study, and the sources of error are considerable, so much so, in fact, that the recorded observations are now no longer to be relied upon. The futility of this method of study is in the main due to two things, first, pathological changes found in the resected nerves might well be the effects of the mechanical force of the operation. Second, the absence of positive findings merely pointed to the fact that the diseased condition was probably farther up the course of the nerve, or in the ganglion itself. A pathology based merely upon hypothesis or analogy is, of course, at this day not worthy of serious consideration.

<sup>1</sup> Read before the St. Louis Medical Society, January 5, 1901.

If we believe, then, in the purely objective method of study, it is evident that most of the early work on the pathology of trifacial neuralgia can have merely an historic interest. The theories of Dana in regard to the *rôle* of the blood-vessels; of Oppenheim, that of an inflammatory degenerative process in the vessels; of Mills, "a form of degeneration of the cells of the ganglion, in which the disease gradually invades all portions of the body, and, as one cell after another drops out, the instability of the ganglion is increased, and with this the tendency to violent sensory discharges;"<sup>6</sup> and of others, fail to satisfy the demand which modern neuropathology insists upon, and must be set aside as inadequate.

The first serious attempt, then, to investigate the pathology of trigeminal neuralgia began about the time of the appearance of Krause's monograph, "*Die Neuralgie des Trigemini*," in 1896. In this work there is an account of the microscopic study of four Gasserian ganglia removed by him, and studied by Sanger.

Although in all some 200 operations for the removal of the ganglia have been done since then, a careful examination has been made in only a comparatively small proportion of them. In fact, at the time of the symposium on affections of the fifth nerve held in Philadelphia at the College of Physicians, April 20, 1900, Spiller reported that no authentic examination by Nissl method of the ganglion had as yet been recorded, and until such examinations have been made in considerable numbers, no very definite statement of the pathology is possible.

It was for this reason that the study of these two ganglia was undertaken, and, as it was possible to use the Nissl stain in both of them, it was hoped that the findings might be of some interest.

Before going into the detailed study of the ganglia and their anatomy, it might be well to suggest certain rules, in the absence of which pathological findings in the ganglia are open to criticism. First, a Gasserian ganglion upon the peripheral branches of which surgical operations have previously been



made in the way of nerve stretching, resection, etc., is unfit for pathological study, or, rather, any conclusions drawn from the findings must be for the most part invalidated, for the reason that the mechanical effects of the operation may cause an ascending neuritis, which might produce changes in the ganglion itself, in the cells, or in the periganglionic tissue. Second, a Gasserian ganglion which is removed by morcellation, or is much torn or cut, cannot be regarded as a favorable object for pathological study. Third, no conclusions in regard to the condition of the nerve-cells are justified, unless they have been studied by the Nissl method or its various modifications. Of course, the ganglion must be examined in a good state of preservation.

The first of the ganglia given to me by Dr. Bartlett fulfilled most of these conditions, except that a peripheral operation had been done some ten years before; the second one may be regarded as an ideal specimen for study.

A few words in regard to the microscopic anatomy of the ganglion Gasserii and the nerves arising from it may make clearer the description of the pathological appearances which follow.

The ganglion in its structure and function is analogous to the sensory ganglion of the posterior nerve-roots of the cord. It is composed of numerous nerve-cells arranged in rows and layers. These cells are sensory in type and structure, and are unipolar. The cells are round, having a nucleus and a nucleolus, which occupy the centre of the cell with the Nissl bodies arranged concentrically around them. The whole ganglion is surrounded and enclosed by connective tissue. This connective tissue runs in between and around each cell, forming a supporting membrane to the cell and for the blood-vessels. A capillary network finely meshed surrounds the nerve-cell and the nerve-fibres arising from them.<sup>2</sup>

The nerve-cells are unipolar, that is, they possess but one process. This is the axis cylinder, which shortly after leaving the cell divides into two branches, one going to the periphery and the other to the brain. The myelinated fibres of the periph-

eral branches form the three main branches of the nerve, and those of the central branches form the great sensory root, which goes to the pons and plunges into it. As soon as it reaches the pons the individual branches again divide into an ascending and descending portion, analogous to the posterior spinal nerves. The ascending root of finer calibre than the other loses itself quickly in the cells of the trigeminal nucleus, or in the substantia gelatinosa, while the descending root forms the well-known spinal trigeminal root, which has been followed as far as the crossing in the medulla.<sup>3</sup>

It can be seen from this brief description that the trigeminus has an immense distribution, both in the medulla and in the cord; and the degeneration involving this immense area, which must necessarily follow in every removal of the ganglion, should be taken into account when the question of operation is considered.

I wish to call your attention to the central sensory root, as this has been found diseased in a few cases, and has given rise to the question of central neuralgia.

The two ganglia studied in this paper were given to me in 10 per cent. formol solution. They were, as can be seen from the photographs, cleanly removed, showing practically no mutilation, and in every way in excellent condition for microscopic study. After being placed in alcohol for a few days they were embedded in celloidin, and cut in the following fashion. No. 1 at right angles to the long axis, and No. 2 parallel to it and transversely. I wish to say that the second method is far better, as each section gives a view of the whole ganglion body, and if portions of the nerve-roots are separately mounted, cross sections can easily be made.

Complete serial sections of both ganglia were made, and numerous sections from each level were examined. The following stains were used: Nissl-methylene blue method, thionin, toluidin blue, neutral red, for the nerve-cells; Van Giesen, Haemalaun, Carmin and Weigert's hæmatoxylin with a previous treatment in chromic acid for the nerve-cells and interstitial structure. Various other methods were tried, but on

account of the formalin hardening were mainly unsuccessful.

Before recounting the findings in these ganglia, a short analysis of the literature on the subject may be of interest. I have been able to collect the reports of twenty ganglia examined after their removal for trigeminal neuralgia. They have, with the exception of Krause's cases, been reported in the last three years, and chiefly by American authors. Of these twenty reports comparatively few will stand the test of strict neuropathologic criticism. By far the most notable contribution to the literature on this subject is by Spiller, of Philadelphia, who has studied ten cases. The best discussion of trigeminal neuralgia from all points of view is found in the series of papers read before the College of Physicians at Philadelphia at the symposium upon the fifth nerve in its neurological and surgical relations, April 20, 1901. Every worker in this field of medicine must acknowledge his indebtedness to the work done there. To take up in any great detail these twenty reports would require more space than is at my disposal, so I shall merely attempt a brief account of the findings as reported.

In Spiller's first series of seven cases, six showed pathological changes. It is to be noted that no Nissl stain was used, as the specimens were hardened in Müller's fluid. The findings were in the main as follows: Medullary sheaths much swollen, likewise the axis cylinders, fibres atrophied, empty nerve-sheaths, atrophied ganglion cells, cells faintly stained, and in one case sclerosed blood-vessels. In one case a decided increase of connective tissue, a distinct sclerosis.<sup>8</sup> In two other cases reported by Spiller degeneration by Marchi method in the medullary sheaths, concentric bodies of brain sand within the ganglion, tumefaction of the axis cylinders in portions of the sensory root; in the second case the ganglion cells were diseased.<sup>9</sup> Although the cells were found affected, there is not evidence enough to show that they are the seat of a primary morbid process. In Spiller's series is included also the case of endothelioma, involving the ganglion operated on by Keen.<sup>10</sup>

In four cases operated upon by Krause and studied by Sanger, the ganglion cells were found diseased in the way of pigmentation, vacuolization, and atrophic appearances. No change was found in the blood-vessel, and no interstitial changes. Krause believes that the changes are first parenchymatous in nature, and then the myelinated nerves are involved.<sup>13</sup> <sup>1</sup> Leser found widened lymph spaces with an increase of wandering cells. Swollen appearance of ganglion cells similar to those described by Krause.<sup>14</sup>

L. F. Barker reports two cases both examined by the Nissl method, scarcely any normal-looking cells, chromophilic cells, yellow pigment, cells swollen, in some, absence of tigroid substance, or Nissl bodies. Some of the nuclei swollen, no typical Marchi degeneration, pigmentary changes in cells, no vascular changes, no interstitial hypertrophy. The same concentric bodies as Spiller describes.<sup>15</sup>

Two cases reported by T. Crawford Renton showed absolutely no abnormality.<sup>16</sup> Coehlo's case examined by Pestana by the Nissl stain,—cell changes of every degree of severity from the slightest modification of the chromatic substance to the complete destruction of the cell and the substitution for it of connective tissue. Infiltration of black pigment in the cells. In places, following the total destruction of the cell, its capsule became filled with round cells of new formation.<sup>17</sup>

It is difficult to summarize these findings on account of their variety and contradiction. It is much more difficult to determine just what weight they should have in any final exposition of the pathology of the disease under consideration. Without reference to any one or series of cases, the pathological findings as a whole might be divided into groups, as follows. In a few cases the ganglion was found to be absolutely normal. Of this group not much can be said except that a certain doubt must always be felt in any report of an absolutely normal condition of a ganglion so pathological in its manifestations as the ganglion in a case of persistent trifacial neuralgia of long duration, for it is assumed that only

in such cases was an operation performed. A second group shows evidence of neuritis and degeneration, so pronounced that there can be no question that this must be considered in any explanation of the pathology of this disease which may be attempted. The third group, composed of Spiller's one case and the second one of mine, shows an interstitial inflammation. A fourth group, composing the largest number of reports, shows nerve-cell changes of various degrees of severity. In all of them, however, the changes are less those of a primary cell affection than a secondary one. It must be admitted that these cell changes of themselves would form an insufficient basis for the pathology of the disease. The presence of brain sand, or concretions, was noted in three cases, and in the second of my series. In all probability these cells have no vital importance. In a very few cases changes in the blood-vessels were noted. Some consideration of these findings will be taken up in the discussion of the changes found in the two ganglia which are the subject of this paper. The pathological details of the first ganglion being less definite and less reliable, for the reasons previously given, than the second, only a brief description of them will be given.

The examination of each ganglion may be divided into three parts; first, the study of the nerve-cell; second, of the interstitial tissue, including the blood-vessels; third, of the nerve-fibres, including what was taken to be the sensory root in the second case.

Ganglion No. 1. In the Nissl preparations the nerve-cells took the stain most unequally, some being stained so densely (chromophilic cells) that no study of their finer anatomy could be made, while others, again, were so slightly stained that they gave the appearance of cell atrophy. The cells were extremely irregular in form, comparatively few showing the full rounded appearance of a normal sensory cell. In many places empty capsular spaces were seen, which formerly contained nerve-cells. Upon closer examination some of these spaces showed what was evidently the remains of degenerated nerve-cells, collections of pigment, scattered tigroid substance, and small, round bodies very

much like an extruded nucleolus. The cells vary much in regard to size. As a general rule, the very small cell took the stain very intensely and showed the greatest abnormality. It is interesting to note in this connection that Head and Campbell, in their recent study of the spinal ganglia in herpes zoster, found that the smaller cells were first and most profoundly affected, and they believe that these cells probably subserve the function of pain.<sup>18</sup> The analogy between the spinal and Gasserian ganglia has been previously alluded to, and in this respect this finding is an interesting corroboration. Some of the cells were much retracted and shrunk, leaving about them large clear spaces generally devoid of any structure at all. The cells which took the Nissl stain in a typical manner showed for the most part no abnormality, the nucleus and nucleolus being in the centre and the Nissl bodies concentrically arranged. In quite a large proportion of cells, evidence of chromatolysis, slight, as a rule, and of the central variety, was found. Pigmentation of the cells was common, the deposited pigment being found, as is usually the case, in the periphery of the cell. Some few cells showed the typical appearance of a nerve-cell pathologically affected in an extreme degree, with migration of the nucleus towards the periphery, vacuolization, etc. They were too few to be of great significance. The interstitial substance was to all appearance normal, no sclerosis being observed. In fact, many cases gave the impression of an interstitial atrophy rather than the reverse; the blood-vessels were normal. The nerve-fibres stained by the Van Giesen method were mostly normal in appearance.

Any interpretation of the findings in Ganglia No. 1 must take into account the early peripheral operation and the hæmorrhage which accompanied its removal, free blood being found in great abundance scattered throughout the ganglion.

Ganglion No. 2. This was a much more favorable specimen for study than the first, on account of the absence of a peripheral operation, the absence of profuse hæmorrhage, and on account of the method of sectioning. Very beautiful preparations were obtained by toluidin blue, with a counter-staining of erythrosin and by Nissl. The nerve-cells in the thionin, Nissl, and toluidin blue stains show the same irregularity in stain reaction as in the first case. This difference seemed to follow no rule, a deeply stained cell being found next to one very faintly stained. In no sense

could there be any grouping of cells based upon their reaction to the stains in point of color. In the main, while the cells could not be said to be absolutely normal, the irregular and atrophied appearances in Ganglion No. 1 were not observed. The empty spaces found in the first case were absent, they being, as a rule, well filled out, allowing for the retraction due to the hardening fluids. Practically, no nuclear changes were found, either in regard to position, form, or staining quality; some cells showed the usual central or peripheral chromotolysis. The pigment deposit in the cells is very curious, and merits a brief description. Instead of being in the periphery, as in the first case, it was here found centrally, chiefly in the neighborhood of the nucleus. The pigment is composed of fine granules, differing somewhat in size, showing a greenish tint in the Nissl preparation and black in the other stains. The pigment was frequently found arranged around the nucleus in the form of a crescent or ring. The form and arrangement of the pigment recalled the pigment deposit in the red blood-corpuscles in malaria. The concentric bodies or brain sand described by Spiller and Barker were found in a few sections towards the centre of the ganglion.

The study of the interstitial substance in this ganglion showed some very interesting facts, and gives a fairly definite explanation of the pathology in the second case. The interstitial substance was greatly in excess of the normal, as shown by the tremendous increase of the nuclei. This nuclear increase was due to a proliferation of two different kinds of cell elements, one having a slightly elongated nucleus characteristic of a connective-tissue cell, the other smaller and circular. This latter was really a cell proliferation, showing in many places the typical appearance of a small, round cell infiltration. In places this cell increase extended into the periganglionic spaces, which were quite filled with small, round cells. Bands of connective tissue anomalous in distribution were to be seen. In the Van Giesen and strictly nuclear stains this increase in interstitial cell elements could be very clearly seen.

The nerve-fibres and nerve-roots as well as what was taken to be the sensory root, and the nerve branches, which were cut separately in cross sections studied chiefly in Van Giesen preparations, showed, beyond a tendency to stain rather faintly and irregularly, no certain evidence of degeneration or atrophy. As it was impossible to use the Marchi stain in formol hardened prepa-

rations, the question of degeneration must be regarded as still unsettled. In a few sections treated first with chromic acid and then stained with Weigert's hæmatoxylin method, appearances in the nerve-fibre and sheath similar to those described by previous investigators were seen, but as these specimens were faulty no reliance can be placed upon them. The blood-vessels were found to be normal.

The findings of these two ganglia might be summed up as follows: In both of them the nerve-cells must be regarded as pathologically altered, but in neither to such a degree or extent as to consider them primarily affected. The definite changes which are found in acute or long-standing parenchymatous nerve-cell affections are certainly missed in these two cases. The more intense cell changes of the first case lose their importance, in a measure at least, on account of the previous peripheral operation on this ganglion. Pathological the cells certainly are, but secondarily affected.

Neuritis and atrophy are probably present in both cases in spite of the failure of the Van Giesen stain to definitely prove their existence. The concentric bodies found in the second case are similar to those described by Spiller and Barker, who designate them by this name, or brain sand, evidently not considering them amyloid bodies at all. Redlich has described such bodies as corpora amylacea, or amyloid bodies, and says that they stain with the nuclear stains, and only the larger ones show a concentric structure around a central nucleus. They are usually found in the spinal cord around the points of exit of the posterior nerve-roots.<sup>20</sup> They occupy analogous positions in this specimen. These bodies, then, in spite of Spiller's and Barker's hesitancy to call them so, are probably corpora amylacea. Their pathological significance is very slight, as their number is so small.

In attempting to resolve the pathological findings of these two ganglia into some general basis for a pathology of trigeminal neuralgia, the same difficulty is present as in every disease where symptoms are the expression of various causes. From these two ganglia, as well as from the reports of the



ganglia before alluded to, it is quite evident that trigeminal neuralgia is not a definite disease, but merely the symptoms of various processes affecting the fifth nerve anywhere in its course from the ganglion to its peripheral termination. It is extremely probable that no disease of the nerve-cells *per se* exists as a primary parenchymatous affection. In the present state of our knowledge we are justified in assuming two main divisions of trigeminal neuralgic affections. First, and the more common, is a neuritis beginning in the terminal divisions of the fifth nerve and having a tendency to ascend to the ganglion. Second, an interstitial inflammation, chronic and progressive, of the ganglion body itself. Of the two specimens studied, I should venture to place No. 1 in the first, and No. 2 in the second category. A third division is possible, and there have been two cases reported, that is, a central neuralgia or neuritis affecting the sensory root as it leaves the ganglion on its way to the pons.

Concerning the etiology of these divisions, our knowledge is too vague to do more than speculate. That trauma and new growths may have some importance has been amply substantiated by the case of Spiller, where an endothelioma was found affecting the ganglia, and by the report of cases where a direct trauma in the region of the ganglion was followed by the neuralgic manifestations, possibly in Case No. 2. The two other causes which play an important *rôle* are in all probability toxic and mechanical. Just how these act is at present doubtful. In the second case, the interstitial hypertrophy might very well exercise mechanical pressure on the ganglion cells, producing in this way the attacks of pain similar to the root-pain of spinal affections. The nerve-cells show the effect of this pressure by their various states of functional fatigue, so to speak, which is shown by their varying reaction to the Nissl stain. However, this is pure hypothesis, which was denounced in the beginning of this paper as being unscientific.

A few words from a neuropathologic point of view in regard to the utility of the operation may not be amiss. It is evident that this operation has a definite basis from the patho-

logical stand-point. Wherever the process is located, the removal of the Gasserian ganglion must be the final means of relief. It is simply a question in what cases operation is justifiable. This is a matter beyond the scope of the present paper. In regard to the so-called central neuralgias, I fail to see what influence this can have upon the utility of the operation. The sensory root, if diseased, can only degenerate to the terminal ends of the neurons involved, and following the law of secondary degeneration the process must stop. Pathological processes in the brain itself other than those due to pressure, and those affecting the meninges, cause no symptoms of pain, and, as the Gasserian ganglia contain the cells of nutrition of the sensory root, their removal is equivalent to placing this portion of the nerve outside of the realm of active symptomatology.

There remain, then, two general lines along which the study of neuralgia of the trigeminus should proceed. First, such an improvement of the operative technique as to render the operation comparatively safe, as suggested by Keen; and, second, such an improvement in our clinical knowledge that it will be possible to tell what portion of the trigeminus is affected. If it is the ganglion, then operation for its removal will be indicated. If in the peripheral branches, then peripheral operation is advisable. Such a knowledge can only be gained by a careful study of each ganglion removed in connection with the symptoms present in each case.

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# OSTEOPLASTIC AMPUTATION OF THE ARM:

WITH THE DESCRIPTION OF A USEFUL SAW FOR OSTEOPLASTIC  
AMPUTATIONS.

By WILLY MEYER, M.D.,

OF NEW YORK,

PROFESSOR OF SURGERY AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL  
AND HOSPITAL; ATTENDING SURGEON TO THE GERMAN AND NEW  
YORK SKIN AND CANCER HOSPITALS; CONSULTING SUR-  
GEON TO THE NEW YORK INFIRMARY.

SINCE Bier has published his investigations regarding the carrying capacity of amputation stumps, formed according to his osteoplastic method, it is but natural that we should have adopted his plan of operation when performing amputations on the lower extremities, except in cases of diabetic and senile gangrene. As a matter of course, the employment of his method has been more rarely extended to amputations on the upper extremities. Up to January, 1900, Bier himself had used it in amputation of the arm only once. (A. Bier: "Ueber Amputationen u. Enartikulationen," *Sammlung klinische Vorträge, neue Folge*, No. 264, page 35).

Feeling convinced that also this class of cases must be benefited by this procedure, I recently performed osteoplastic amputation of the arm in a man, fifty-eight years of age, who had within the last six months twice undergone extirpation of an ulcerating epithelioma at the lower end of the dorsum of the forearm, at the hands of another surgeon. He now presented a second recurrence of the disease. Amputation of the arm at the junction of middle and lower thirds seemed indicated, and was done, according to Bier, in November, 1900, at the Post-Graduate Hospital.

Under artificial anæmia a large tongue-shaped skin-muscle flap was formed, with its convexity downward. Quite a number of muscular fibres were left adherent to the periosteum, which was divided by an incision corresponding to about 270 degrees of a circle, a little larger than a fifty-cent piece, with its upper base about a finger's width below that of the skin-muscle flap. Then, the periosteum having been pushed back for about one-quarter of an inch with the raspatorium, a bone-flap was sawed out with the convexity downward. The saw used (see Fig. 2) was constructed by me last summer for this class of operations. When approaching the periosteum at the upper end, the saw was removed and quite a portion of the bone broken with the help of two sharp pointed elevatoria. I had to refrain from biting off the upper, irregular part of the bone-flap with the rongeur forceps on account of the extreme frailness and thinness of the periosteum, which, in spite of most gentle handling, tore in different places. However, I succeeded in well stripping back the periosteum at the upper end for at least one-fourth to one-third of an inch upward, so as to give the bone-flap a good pedicle. Now a small posterior (internal) skin-flap was formed and the shaft of the bone sawed off in a curve, with its convexity upward. When placed in position, the convexity of the bone-flap nicely fitted into the concavity of the shaft, thus sealing the marrow cavity and fully covering the bone itself. The operation was then finished in the usual way. It proved impossible, however, to fasten the periosteum which overlapped the osteoplastic bone-flaps to the surrounding tissues with catgut stitches, as it ought to have been done. Every stitch tore. The piece of bone was therefore simply placed in position in front of the marrow cavity; suture of the skin; one short drainage tube at inner angle. When completing the dressing, it was distinctly felt, to our annoyance, that the small bone-flap slipped to some extent. Healing took place by primary union. In order to give the bone-flap time to become attached to the surrounding tissues, the dressing was not touched for the first twelve days.

Three weeks later the chain of infiltrated glands below the subclavian and axillary veins were removed. On January 9 the patient was presented before the New York Surgical Society with a good stump.



FIG 1—Osteoplastic amputation of the arm



As will be seen from the accompanying X-ray picture (Fig. 1), which was kindly taken for me by Dr. F. N. Wilson, Instructor in Surgery at the Post-Graduate School, the bone-flap really had moved out of place a trifle. Nevertheless, as the illustration shows, its one side well sealed the marrow cavity, so that hard pressure against the lower end of the bone, as well as a hard blow against it, was absolutely painless. According to Bier, the sealing of the marrow cavity with bone generally suffices to make the stump painless. However, it is better and easier to cover the entire cut surface of the shaft with a piece of bone.

In my next osteoplastic amputation of the arm, I shall let the periosteum overlap the bone-flap for a good deal more still, in order to be sure to have sufficient when putting in the necessary catgut stitches, folding up the brittle periosteum if necessary. I shall also make the inner skin-flap somewhat larger than I did in this instance.

Of course, when amputating other parts of the extremities according to Bier, especially the tibia, we need not fear annoyance from the friability of the periosteum, as here the periosteum is invariably firm and not likely to tear.

As regards the saw, I am well aware that Gigli's saw may be used to some advantage in osteoplastic amputations, particularly on the tibia. When operating on humerus and femur, it will, however, be found unsatisfactory.

Bier makes use of Helferich's bow-saw, modified by himself. The traction-hook at either end carries three slits, one in line with the bow, and one each on the right and left side, at an angle of about  $85^{\circ}$  to the first.

As mentioned above, I have constructed a saw for this kind of work, which enables the surgeon to give the blade any angle desired. It is made by Messrs. George Tiemann & Co. This saw will be found especially useful, I think, in forming the small round bone-flap of femur and humerus, as required in this mode of amputation. It may also be advantageously used when making a concave or convex cut of bones for other purposes, for instance, in Kocher's resection of the knee or elbow. In the case just reported, it has given me entire



satisfaction. The accompanying cut (Fig. 2) nicely illustrates the instrument.

The traction-hooks at either end of bow are octagonal; this permits of setting the blade at almost any angle. To change angle of blade, loosen traction-screw, *C*; then push back the traction-hook at end nearest the handle of the saw and turn the blade to the desired angle. Then push back the

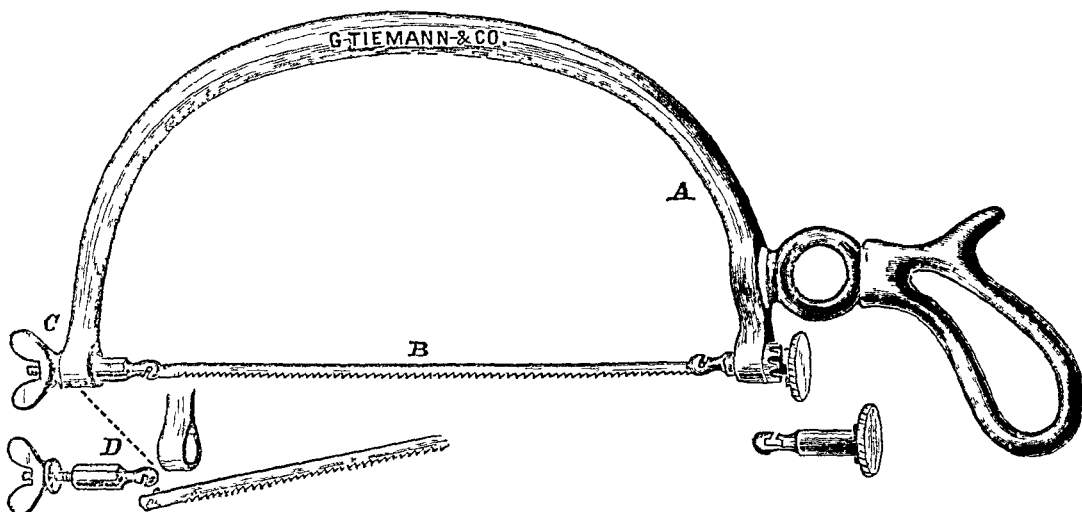


FIG 2—*A*, Steel bow and handle; *B*, saw-blade three millimetres wide; *C*, tension-screw; *D*, traction-hook.

traction hook nearest the handle into the slot of the socket corresponding to the angle of the blade. The traction-hook *D* will follow voluntarily. This being done, the blade is again made taut by the traction-screw, *C*, when the saw is ready for use.

The saw is thoroughly aseptic, as both traction-hooks can be easily removed from the bow after the blade has been unhooked.

# CASES OF LACERATION OF THE SPLEEN AND OF THE KIDNEY FOLLOWED BY RE- COVERY AFTER THE REMOVAL OF THE INJURED ORGAN.

By SAMUEL J. MIXTER, M.D.,

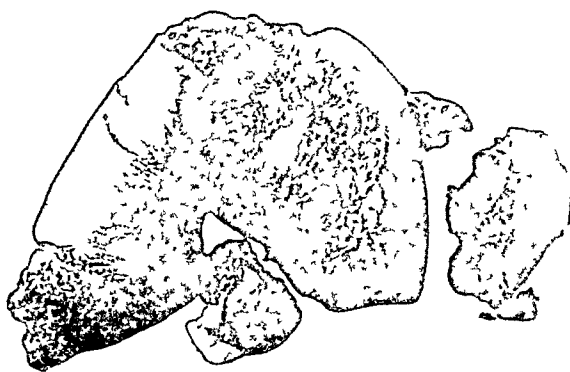
OF BOSTON, MASS.,

SURGEON TO THE MASSACHUSETTS GENERAL HOSPITAL.

THE following case of laceration of the spleen is reported at this time to make more complete the record of work in the Surgery of the Spleen contained in the memoir of Professor Warren published in the May number of the ANNALS OF SURGERY.

F. D., twenty-five years of age, a machinist by occupation, at 11 30 A.M., while setting up a locomotive, was struck along the left costal border and pinned against a brick wall by one of the driving-wheels, which fell over against him.

On examination shortly afterwards, in the accident room of the Massachusetts General Hospital, he was found to be a well-developed man; heart and lungs normal; general condition rather poor; he had vomited once, normal stomach contents; abdomen was very tender, especially in the epigastrium, and there was dulness in both flanks; slight abdominal rigidity; no external mark of injury



Rupture of the spleen (Mixter's case).

save a few bruises along the costal border. Temperature, 102.2° F.; pulse, 104; respiration, 30.

An incision in the median line from ensiform to three inches above pubis showed much free blood in abdominal cavity. Liver first examined

and found intact. On washing out with salt solution, a piece of ruptured spleen was found free in the abdominal cavity. A transverse incision was made to the left; another free piece of spleen was found, and the main body of the spleen was seen to be torn and hanging by a few shreds of tissue, and was removed without ligation. The splenic artery was torn and spurting, and was tied, together with the splenic vein. Gauze was packed into abdomen in site of spleen.

During the operation, a quart of salt solution was injected into a vein in the arm. The patient's pulse fell from 130, at the end of the operation, to 100 in the evening. The gauze packing was removed on the fourth day, and recovery was uneventful, with the exception of some sepsis in the external wound, due probably to the hurried preparation before the operation.

**FRACTURE OF THE KIDNEY; NEPHRECTOMY; RECOVERY.**—On May 29, 1899, A. C., a slight, delicate girl of ten years, while crossing a paved street, was knocked down and the wheels of a heavy express wagon passed over her back. She was taken at once to the office of Dr. R. W. Lovett, under whose care she had been for slight lateral curvature. On her arrival she had almost no pulse and seemed to be dying.

I saw her within a half-hour, when she had revived a little under stimulation. There was no external sign of injury. The abdomen was tender, rather more on the right than on the left, and rigid. After a time she passed a quantity of bloody urine.

She was at once removed to a private hospital and operated upon.

The usual lumbar incision exposed an infiltrating hæmorrhage into the deep muscles and perinephritic tissues, and a rent in the peritoneum through which a large quantity of blood was evacuated. The torn kidney could be felt in the bottom of the wound, was drawn out, and the few shreds of tissue by which it was attached were ligated and the mass removed. It was found that this represented little more than half the organ, and the hand being introduced into the abdominal cavity found the other fragment free near the stomach. This was removed, the abdomen washed out, and the wound partially sutured and packed with gauze.

Recovery was uneventful, and the child has suffered no inconvenience since from the wound or the loss of the kidney. Her parents report her as being much stronger during the past two years than before the accident.

These two cases are reported as showing the extensive comminution of an abdominal organ that may take place without external injury or immediate fatal hæmorrhage, and the value of early operation.

# THE OPERATIVE TREATMENT OF CIRRHOSIS OF THE LIVER.<sup>1</sup>

By CHARLES H. FRAZIER, M.D.,

OF PHILADELPHIA.

A LABORING man, of middle life, was admitted into the medical ward of the University Hospital, May 10, 1900. He had contracted syphilis in 1882, and had always been a free user of alcohol and tobacco. His heart was enlarged, and a systolic murmur was plainly audible over the whole præcordia. The lungs were normal. Both the spleen and liver were enlarged; the upper margin of the liver was on a level with the fifth rib, and the lower border could be plainly felt below the costal margin. The abdomen was greatly distended with ascitic fluid, and the lower extremities were cedematous. The urine was an amber color, cloudy, its reaction acid, specific gravity 1019; it contained a trace of albumen and a few pus and blood-cells, but no casts. The administration of digitalis, theobromine, caffeine, diuretin, urea, strophanthus, and other diuretics had no appreciable effect upon the ascites. Paracentesis was resorted to on May 30, and repeated four times, at intervals of about two weeks, on which occasions 512, 485, 330, and 400 fluidounces, respectively, were withdrawn. The case was regarded as a rather hopeless one, and at my suggestion the patient was transferred to the surgical ward.

Operation, July 25, 1900. It was my intention to perform the operation under local anæsthesia; but after opening the peritoneal cavity, the manipulation elicited so much pain that it was necessary to finish the operation under ether narcosis. The parietal peritoneum of the abdominal wall on either side of the incision was rubbed quite vigorously with a gauze pad, and the omentum, which was very much thickened and contracted, sutured to the parietal peritoneum and to the margins of the wound. The

<sup>1</sup> Read before the Philadelphia Academy of Surgery, December, 1900.

fluid contents of the abdominal cavity were evacuated and the incision closed without drainage. Convalescence was uninterrupted; the patient suffered no ill effects from the operation. The wound healed throughout *per primam*. The history subsequent to the operation—since which three months have elapsed—is briefly as follows: The patient has been tapped twice, once on the thirteenth day, 328 fluidounces having been withdrawn, and again on the thirty-sixth day, on which occasion only 96 ounces were withdrawn. From that time to the present writing there has been absolutely no reaccumulation of fluid. The patient has gained rapidly in strength; he is no longer bedridden, goes out daily, and receives no medication other than enough citrate of magnesia to insure a daily evacuation of the bowel.

*Remarks.*—This operation purports to open another channel for the relief of the obstructed portal circulation. I say another channel, because there already exists a more or less free collateral circulation between the systems of the portal vein and the inferior vena cava. Thus, the coronary anastomose, through the œsophageal plexus, with the azygos veins; the veins of the cæcum and colon with the internal mammary; the hypogastric with the hæmorrhoidal; the veins of the hepatic ligament with those of Glisson's capsule; the veins of the round ligament with the epigastric. By inciting the formation of adhesions between the omentum and the abdominal wall and between the surfaces of the liver and spleen and that of the diaphragm, this operation furnishes an additional outlet for the blood of the obstructed portal system. The examination of specimens obtained at the autopsy table has proved beyond a doubt that the operation as conducted accomplishes this purpose. Thus, in the case operated upon by Lens, venous channels were easily demonstrable in the adhesions that had formed between omentum and peritoneum.

The technique of the operation is very simple. The operation should be performed preferably under local anæsthesia, as individuals afflicted with cirrhosis of the liver are usually alcoholics and belong to a class in which ether narcosis of itself has a very material effect upon the mortality. An incision three

or four inches in length is made in the median line, or in the border of the rectus, above the umbilicus. The peritoneum of the adjacent surfaces of the diaphragm, liver, and spleen, respectively, and the peritoneum on either side of the wound are scarified with a blunt curette or rubbed with a gauze pad. The latter is the better procedure, as it will give rise to less bleeding, at the same time exciting a peritonitis sufficient to insure adhesion between the opposed surfaces. The omentum is sutured to the parietal peritoneum for a distance of three or four inches on either side of the wound and to the margins of the wound itself. The evacuation of the fluid completes the operation, the wound being closed without drainage. In a number of the recorded cases tubular drainage was inserted through a suprapubic opening and removed about the fourteenth day. This step of the operation, I believe, should be omitted; it can have no beneficial effect upon the ultimate results, while it certainly introduces an additional element of risk, as in Weir's case, which died of purulent peritonitis, the tract of the drainage tube furnishing the avenue of infection. It may be necessary, if drainage is not introduced, as in the author's case, to tap the patient on one or more occasions during the time the adhesions and venous channels are in process of formation. The dressing is secured in place by broad strips of adhesive plaster, which are applied with the object of keeping in apposition the scarified surfaces of the liver, spleen, and diaphragm.

The chief indication for the operation is the presence of ascites due to obstruction of the veins of the portal system, when the obstruction itself is due to cirrhosis of the liver. It should be borne in mind, however, that the operation is not indicated in every case of hepatic cirrhosis with ascites; the operation is absolutely dependent for its success upon the retained function of the liver-cells. In other words, the absence of functional activity is an absolute contraindication. It has been suggested that the presence of cardiac or renal disease should constitute a contraindication, but this might be regarded rather as a relative than as an absolute one.

Apart from the risks attending any operative procedure

upon patients with chronic visceral disease, there are certain well-recognized dangers peculiar to this operation. These have been proven by the experiments of Eck, Hahn, and Tillmanns, who called attention to the serious consequences attending the entrance of the blood from the mesenteric veins directly into the general circulation. When Tillmanns ligated the portal or mesenteric veins, the animals died; when, however, he waited until he had established a collateral circulation by an operation similar to that above described, he found he could gradually cut off the venous blood going to the liver without such disastrous results. Hahn observed a number of nervous phenomena exhibited by dogs in which he had established a free anastomosis between the vena cava and porta. These nervous phenomena, which were nothing more nor less than evidences of auto-intoxication, were observed in the third case of Morrison's series. The patient recovered from the operation, but for a period of some ten months he exhibited certain nervous symptoms; they subsequently disappeared. Apart from demonstrating experimentally the dangers and origin of these nervous complications, the experiments of Hahn, Eck, and Tillmanns emphasize the necessity, as has been pointed out by Weir, of bringing about this collateral anastomosis gradually, so as to use the intravening capillary circulation as an assimilator, and thus avoid fatal toxæmia.

*Results:*—At the time of this writing, the records of but fourteen cases (including the author's) have appeared in literature. The number of operations therefore is so limited that no very definite conclusions can as yet be drawn. When we exclude those in which there was some error of technique, those in which there was an error of diagnosis, or those in which the operation was contraindicated, but eight cases remain. Of these none died (mortality, 0 per cent.), one was living and unimproved (12.5 per cent.), one living and improved (12.5 per cent.), and six were living and free from ascites at periods of three, four, six, twenty-four, twenty-four, and twenty-six months respectively (75 per cent.).

Though our experience is as yet very limited, I believe

that in properly selected cases—and by that I mean those cases (1) in which the liver is cirrhotic; (2) those in which there is reason to believe the liver-cells are not devoid of function; (3) those in which internal medication (particularly iodide of potassium) and paracentesis fail to afford relief, or, in other words, in utterly hopeless cases, and (4) those in which there is no reasonable contraindication—the operation has a future. The cases are so hopeless, the technique so simple, the dangers so trivial, and the outlook so promising, that the prospects of this mode of treatment becoming an established one seem bright. That surgeons now have at their command a method, both rational and reliable, of affording relief, sometimes temporary but often permanent, to intractable cases of ascites seems to me a very fair conclusion to draw from the accumulated evidence.



# ANGINA LUDOVICI.<sup>1</sup>

By GEORGE G. ROSS, M.D.,

OF PHILADELPHIA,

ASSISTANT SURGEON TO THE GERMAN HOSPITAL.

LUDWIG's angina, or phlegmonous cellulitis of the floor of the mouth, is a comparatively rare affection. It is a disease which is so rapid in its development, and is attended by symptoms so distressing in character and accompanied by such a high rate of mortality, that any addition to the literature extant upon the subject may be of interest.

Ludwig, of Stuttgart, in 1836 was the first to describe the disease in detail, hence the name.

The disease is an infection of the thick layer of loose connective tissue which fills in the space between the symphysis of the jaw and the muscles of the floor of the mouth. This tissue is rich in lymphatics and blood-vessels, and contains the ducts of the sublingual and submaxillary glands. The disease may be either primary or secondary.

Primary infection may arise from wounds or ulcerations of the floor of the mouth and carious teeth; retarded development of the third molar or so-called wisdom tooth is an especially fruitful source of the trouble. Frequently a third molar will develop in the angle of a jaw already filled with teeth, causing pressure necrosis of the tooth and the portion of alveolar process of the jaw forming its bed, thus giving rise to an abscess and a subsequent infection.

The secondary infections arise in conjunction with those infectious diseases which are accompanied by manifestations in the mouth, *e.g.*, diphtheria, scarlet fever, tonsillitis, etc.

<sup>1</sup> Read before the Philadelphia Academy of Surgery, November 5, 1900.

An interesting discussion has arisen as to the differentiation of the acute infectious diseases of the larynx, pharynx, and floor of the mouth. Semon (Royal Medical and Chirurgical Society, London, 1895, Vol. lxxviii, pages 181-238) claims that "the various forms of acute septic inflammation of the throat and neck, hitherto considered as so many essentially different diseases, are in reality so pathologically identical that they merely represent degrees varying in virulence of one and the same process, that the question of their primary localization and subsequent development depends in all probability upon accidental breaches of the protecting surface through which the pathogenic micro-organism, which causes the subsequent events, finds an entrance, and that it is absolutely impossible to draw, at any point, a definite line of demarcation between the purely local and the more complicated, or between the œdematous and the suppurative forms."

He reports fourteen cases, all of which were of the secondary type of infection. It would seem clear, from his cases, to consider the acute septic infection of the larynx and pharynx as one and the same disease, and, so far as the character of the invading micro-organisms is concerned, the primary may be included.

However, in true angina Ludovici the course is different and the infection essentially primary. The point of entrance is in the mouth proper, and the disease manifests itself primarily in the floor of the mouth, and secondarily in the pharynx and larynx.

The pathology so far as known is very similar, if not identical, with that of erysipelas. The organisms which have been discovered, from the researches of modern investigators, are the streptococcus and the staphylococcus. It has been suggested that there is some organism which is especially virulent and active in this disease, but as yet it has not been discovered.

G. Leterier ("Du Phlegmon sublingual dit Angina," Thèse, Paris, 1893) has collected thirty-one cases with thirteen recoveries. This series includes cases collected from old literature, and the mortality is therefore higher than at present.

Early recognition of the disease and prompt surgical interference will in all probability still further reduce the death-rate. Spontaneous cure by rupture of the abscess into the mouth may occur, but the majority will terminate fatally unless operation is instituted.

The symptoms are marked from the onset of the disease. They develop very rapidly and are of the greatest severity. Frequently, in a few hours after the earliest manifestation of the disease, a hard swelling will be found between the arch of the lower jaw and the hyoid bone. The swelling spreads rapidly, soon involving the neck and face in a hard, dark red, brawny induration. Respiration is soon impeded by involvement of the deep connective tissue of the neck. The pharynx and larynx become involved, and attacks of acute dyspnoea with cyanosis supervene. The swelling may spread downward to the anterior mediastinum and on to the chest wall. Inspection of the mouth, although unsatisfactory, due to fixation of the jaw, will disclose the sublingual tissue to be so œdematous as to push the tongue against the roof of the mouth. In the early stage the swelling is unilateral, but soon both sides become involved, and deglutition becomes difficult or impossible. Supervening the local condition a marked general sepsis occurs.

CASE I.—Dr. W. S., while studying in Berlin, had an acute infection of the submaxillary region arising from a necrotic and undeveloped wisdom tooth. The inflammation developed rapidly, and in twelve hours from the onset of the attack the symptoms were so marked that operation was demanded without further delay. The wisdom tooth being pried away from the last molar, fetid gas and pus escaped; the inflammatory mass in the submaxillary region was then incised. The symptoms rapidly subsided, only to recur a few weeks later, when he was again operated upon and the offending tooth chiselled out.

CASE II.—Carl S., Austrian, aged twenty years. Family history good. Personal history excellent. Gastric fever at the age of six; no venereal trouble. Uses alcohol moderately and tobacco in excess.

He worked his way to this country, and attributes his bad teeth to neglect during the voyage. He is a printer by trade, but had been a farm-hand for the three months of his residence in America. He had had toothache for four days prior to his admission to the German Hospital, September 29, 1900, about 8 P.M. At the time of admission there was some swelling and induration in the left submaxillary region, red and angry looking, very painful to touch, and interfering with the motions of the jaw. Respiration, 24; temperature, 102° F.; pulse, 86, full and bounding. Three hours after admission he awoke with a marked dyspnoea and cyanosis, which partially subsided, only to recur again with increased severity. The attacks of dyspnoea seemed to come in periods, and were relieved by violent voluntary inspiration. He would grasp the porch railing, extend his neck forcibly, and thus enable himself to inspire enough oxygen to last for a few minutes. The house surgeon prepared for an immediate tracheotomy, which, however, was deferred from time to time upon the amelioration of the attacks. By 12.30 the induration and swelling had extended from the angle of the jaw on the left side to that of the right and down the neck to the clavicles. The hyoid bone and pomum Adami could not be made out. The swelling was hard, very painful, dark red, and brawny in character, not unlike that of erysipelas.

The chin was held well advanced and rigid. The jaws were separated about half an inch, and between the teeth the under surface of the tongue could be seen; the latter being pushed upward to the hard palate by the œdematous sublingual tissue. The jaws were forced apart, disclosing a general œdema of the anterior pillars of the fauces, buccal mucous membrane, and the sublingual tissues; the last two molars were carious, and an undeveloped wisdom tooth was present.

An incision was made into the œdematous sublingual tissue on both sides of the frænum. A considerable amount of bloody serum escaped, and in a few minutes his respiration became less labored. Ice-bags were applied, and the patient returned to bed; he slept for some hours. The temperature reached 104° F. and the pulse 118 by 5 P.M., September 30.

On October 1 the swelling had increased until it extended upward upon the face as far as the zygomatic arches and down upon the chest wall to midsternum. Fluctuation was now unmis-

takable for the first time just below the symphysis of the jaw. A few whiffs of chloroform were administered, and the abscess opened by an incision which went through the muscles forming the floor of the mouth. The abscess cavity extended around the entire underside of the jaw from angle to angle. The pus which escaped was extremely fetid. As this stage of the proceeding was reached, the patient ceased breathing, necessitating an immediate tracheotomy, and this in a neck with obliterated landmarks. Respiration being re-established, the operation was completed by the removal of the offending teeth. A mallet and chisel were necessary for the extraction of the wisdom tooth. The patient reacted promptly. By the fourth day after operation two patches of impaired resonance could be made out, one in the right lung in the midaxillary line, the other at the left base. There was, however, no evidence of a frank pneumonia.

On the fifth day, a secondary abscess on the right side, extending from the submaxillary region to the zygomatic arch, was opened, which allowed a quantity of fetid pus to escape. Prior to the evacuation of this secondary collection deglutition had been impossible, and rectal alimentation had been resorted to. In a few hours he was able to swallow liquids freely. The tracheal tube was removed in thirty-six hours. The convalescence was progressive despite an attack of bronchitis. The after-treatment consisted of iron, quinine, and forced nourishment.

As a result of the inflammation of the larynx, aphonia has resulted. The condition of his larynx (as reported by the laryngologist) is as follows: "The larynx shows evidence of an attack of perichondritis. The vocal cords are hidden by the greatly swollen and thickened ventricular bands. The arytenoid cartilages are also obscured by swollen mucous membrane which also involves the interarytenoid space. There appears to be no paralysis of the laryngeal muscles, but their normal action in phonation is prevented by the greatly thickened condition about them. Directly in the centre of the laryngeal opening a passage sufficient for respiration leads down to the trachea, between the swollen ventricular bands."

The pathological report states the bacteriological findings as follows:

"Examination was made of the patient's blood and of pus from the wound, both taken October 2, 1900. The blood was re-

moved from the median cephalic vein by means of an aseptic hypodermic needle after aseptic incision of the skin overlying the vein. A moderate quantity of blood was introduced into six bouillon tubes and four agar tubes. These were examined on several occasions, but all remained sterile at the end of ten days. From the pus cover-slip preparations were made and several bouillon tubes and agar tubes were inoculated. The cover-slip preparations revealed staphylococci and streptococci. The inoculated tubes also revealed streptococci and staphylococci; the latter by further culture methods proved to be the staphylococcus pyogenes aureus. On October 6 another examination was made of the pus from the wound, cover-slip preparations and inoculations again being utilized. These again revealed the staphylococcus pyogenes aureus and the streptococcus pyogenes. The latter grew both in short chains as well as in long chains, many of them being excessively long. Blood count: Hæmoglobin, 63 per cent.; erythrocytes, 4,630,000; leucocytes, 9800."

There is another lesson to be learned from a study of Case II. The character and intensity of the symptoms and the destructive tendency of the inflammation lead to the isolation of the patient. The pathological findings indicate that the disease is in all probability erysipelatous in character, and therefore, in an active surgical hospital, these cases should be isolated.

# COMPLICATIONS IN FRACTURES INVOLVING THE HIP-JOINT.<sup>1</sup>

By JOHN E. OWENS, M.D.,

OF CHICAGO,

PROFESSOR OF SURGERY IN THE NORTHWESTERN UNIVERSITY MEDICAL SCHOOL;  
SURGEON TO ST. LUKE'S HOSPITAL.

COMPLICATIONS connected with a fracture involving the hip-joint are varied and interesting. For convenience they may be divided into those more intimately connected with the traumatism under discussion and those that are more or less remote, both as to time and place. The fractures in question are frequently hazardous, and many of them present difficulties in diagnosis. Under the first class, we include contusions, sprains, dislocations, and fractures involving several of the constituents of the joint, or, in other words, fractures beginning in the ilium, pubes, or ischium and extending into the acetabulum, as fractures of the vault may involve the basal fossæ. Shot wounds involve tendons, ligaments, and other soft parts to the extent of laying open the capsule. Shot fractures likewise implicate the acetabulum, the head, neck, and, in some cases, the trochanters, in such a way as to involve the joint. Injuries, also, of the upper portion of the thigh, whether of the shaft, or whether the case be one of open wound of the soft parts, become important in consequence of the spread of infection to a degree which may involve the hip-joint.

In military practice, shot fractures involving the hip-joint, with their varied complications, present problems most difficult of solution. A tabular statement of 386 shot fractures of the hip-joint exhibits the following: Acetabulum without fracture

<sup>1</sup> Read before the Chicago Surgical Society, February 1, 1901.

of the femur; acetabulum and head of femur; acetabulum, head, and neck of femur; acetabulum, head, neck, and trochanter major; acetabulum, head, neck, and shaft of femur; acetabulum and neck of femur; head of femur; head and neck of femur; head, neck, and both trochanters; head, neck, and trochanter major; head, neck, and shaft; neck of femur; neck and both trochanters; neck and trochanter major; neck and trochanter minor; neck and shaft; trochanter major involving the hip-joint, upper part or upper extremity of the femur.<sup>1</sup>

Under the head of remote or general complications, in 249 fatal cases of shot fractures of the hip-joint treated by conservatism, fragments of bone were removed in twenty-one cases, pyæmia was indicated in thirty-eight cases, gangrene in thirteen, tetanus in one case, erysipelas in one case, peritonitis in five cases, and secondary hæmorrhage in fourteen cases. In one case the femoral artery was tied, and in two instances the external iliac artery was ligated. In four instances the missile penetrated the abdomen; in nine cases the pelvic cavity was pierced, but apparently without injury to the viscera. In fifteen cases a shot fracture of either the ilium, ischium, or os pubis was reported; in two instances the bladder was involved, and in twenty-two cases the injury to the hip-joint was complicated by various other injuries of less gravity.<sup>2</sup> In shot fractures of the hip-joint, injuries of the femoral vessels, compound fractures, fractures of the shaft, and wounds of the knee-joint, become serious complications.

In spite of the most laudable efforts on the part of the surgeon, often much anxiety is experienced as to the outcome of the fractures.

Will the vascular supply to the proximal fragment be sufficient for the purposes of repair? Will union or non-union be the final result? An atheromatous condition of the blood-

<sup>1</sup> Medical and Surgical History of the War of the Rebellion, Part Third, Surgical Volume, page 65.

<sup>2</sup> Medical and Surgical History of the War of the Rebellion, Part Third, Surgical Volume, page 87.



vessels is very common in the aged. May not the same condition in the diffused variety exist in the arterial branches which accompany the round ligament, and thus diminish the blood supply? Limited lacerations and a few punctures of the capsule are common, but the more extensive lacerations of this structure must be considered under the head of local complications. Carcinoma and sarcoma, both primary and secondary, have served as the foundation of spontaneous fracture, and in my own practice a fracture occurred at the base of the femoral neck during an examination of sarcoma, involving the upper part of the shaft.

Inversion of the limb in cases of fracture of the hip-joint is so rare that it may justly be classed under the head of complications. In 359 cases, Hamilton records two cases of inversion. In my own practice, I have kept no statistics of the whole number of fractures of the hip-joint, but they have probably reached several hundred, and among these I have only seen two cases of inversion—one, that of a feeble, old man treated at St. Luke's Hospital. A short time afterwards I encountered the remains of this patient in the dissecting-room and removed the hip-joint. The fracture was impacted in such a manner as to hold the leg in a state of inversion. The case was published in the *Chicago Medical Examiner*, including a cut of the bone. The second case of inversion above referred to was the following:

A male, twenty-seven years old, weighing 172 pounds, came under my care, May 18, 1900, three months after the accident, which consisted of a fall of twenty-two feet. The fall was broken somewhat by grasping a beam, but he struck on his right foot, which was driven through the floor. When I saw the patient there was shortening of one inch. The leg was straight but inverted. A rectal examination revealed a prominence of the floor of the acetabulum on the injured side, and this prominence did not exist in a corresponding locality on the uninjured side. The radiograph, so far as we were able to interpret it, revealed a fracture of the neck, and of the rim of the acetabulum, with a subluxation of the head of the femur. Under the influence of an

anæsthetic, after a fixation of the pelvis and during strong extension, the leg, being somewhat abducted, was placed in plaster of Paris reaching from the foot to the waist, and the patient kept in bed. A few days before his discharge from the hospital, August 21, 1900, the plaster of Paris was removed, and its use discontinued for three or four days. It was found that the foot remained in its normal position, although the patient was not allowed to get up. After reapplication of the plaster of Paris, the patient went home, having been directed to wear the dressing for two and a half months longer and to use crutches. The plaster was finally removed in the last week of October, since which time the leg has been without a dressing.

Under date of January 21 of this year, patient wrote me that, "owing to sickness in his family, he had been kept on his feet more than usual, but that he was feeling good and getting around pretty well; that the leg pained some about the hip, but that the more he exercised it the better it seemed to feel; that in bending it he was making satisfactory progress; that he could sit with comfort, and could almost bend the knee to a right angle." He called to see me on Wednesday last, January 30. He usually walks with the aid of two canes, but he walked eight or ten feet without a cane; and he informed me that he was able, at home, to walk about eighty feet without a cane, but he always uses two canes out of doors. His longest walk has been about half a mile. There is now no inversion, the leg being slightly more everted than the uninjured one. Eleven months have elapsed since he was injured.

We may now dwell for a moment on the more remote complications. A neglect to frequently change the position of the upper parts of the body, and a neglect to carry out other treatment indicated, is very frequently productive of bed-sores, —a serious complication in the class of fractures in question; and, of course, the difficulties in the prevention of these increases in those cases where there is dribbling of urine, as there is nothing causes a bed-sore so quickly as pressure associated with urine soakage.

Phosphoric acid has been found in the urine in such quantities as to suggest its origin in the decalcification of the bones,

and where this is a marked feature, imperfect union or failure of union might not unwisely be prognosticated. Other remote conditions play an important part, not only in the production of the fracture, but also in its repair. Among these we may mention paralysis, locomotor ataxia, diabetes, pregnancy, and osteomalacia. Observation among lunatics, especially those who are also paralytic, manifests the play of diseases of the nervous system in the production and repair of fractures. The loss of the vital powers in the aged and their inability to well bear confinement to bed is a serious complication, and results in many fatalities.

Fatty embolism, septicæmia, delirium tremens, and pneumonia are practically fatal complications, except pneumonia, from which a considerable number recover. Nerve injury, as a complication, is not to be ignored. I have encountered one such case, namely, foot-drop, which may be compared to "wrist-drop" from injury or pressure of the musculo-spiral in case of fractured humerus.

A tall, thin man, sixty-five years old, sustained a fracture of the neck of the left femur. Being in good health, the leg was treated by extension and counterextension and by confinement to bed. He was never able to flex the left foot upon the leg, although there were no complications in or about the ankle- or knee-joints.

The condition above referred to arose doubtless from the paralysis of the external popliteal, arising from pressure of the retaining bandage and adhesive straps which were used for extension. He had been confined to bed for two months. An apparatus was devised for the foot, in order to hold it up, and this very much facilitated his walking. Nor did this complication seem to be serious until seven or eight years subsequently, when he fractured the neck of the other femur. Being out of health in other respects, although able to be up and about the house and to walk on crutches with assistance, the disability arising from the two fractures, together with the paralysis and melancholia, were too much for him to contend with. He subsequently died of pneumonia months after the fracture last named.

Thrombophlebitis as a remote complication would not be so unexpected where the blood-vessels had been injured or as

a result of sepsis; but without apparent injury, phlebitis associated with a fracture of the hip-joint is exceedingly rare.

A male, seventy-three years old, fairly healthful, with the exception of atheromatous arteries, sustained a fracture of the neck of the right thigh-bone, October 17, 1900. Extension was effected by the employment of Hodgen's modified splint; there being nothing particularly unfavorable, the patient was kept in bed for two months. Deep respirations were employed several times during the day and the administration of strychnia and such other tonics as the patient seemed to require. October 28, eczema, to which the patient had been subject from time to time during the latter part of his life, appeared under the adhesive straps, in consequence of which it was necessary to remove them. The moist patches were liberally dusted with a desiccating powder. The leg was enveloped with bandages of sheet wadding to a point just above the knee. Plaster of Paris was then applied. Incorporated with this were two strips of ordinary bandage, one on each side. By means of these, together with the plaster of Paris, I was able to continue the extension. November 7 the plaster of Paris was removed and mole-skin plaster substituted, the eczema having disappeared. The extension was finally removed on December 11, the leg being in fair condition as to its nutrition, and the condition of the knee- and ankle-joints functionally satisfactory. Varicose veins did not exist.

The shortening was in three measurements, at varying intervals, three-eighths, seven-eighths, five-eighths of an inch. From December 13th to the 16th, the patient, with assistance, sat for a few moments on the side of the bed, the feet being on the floor, this with a view of getting him accustomed to the upright position. On December 17 he was placed in a chair by the side of the bed for a few minutes. From December 17th to the 24th he sat up a part of the day; was instructed in the use of crutches, and was able to walk across the room on crutches, further assisted by the nurse or myself. After the removal of the extension apparatus, massage was employed for both legs. On the last named date, December 24, symptoms of phlebitis appeared on the left or uninjured leg. The limb became moderately swollen; the skin shiny; superficial veins enlarged; inability for a day or two to completely extend the limb, and soreness on pressure in the course

of the tibial, popliteal, and femoral veins, with moderate induration. There was a rise of temperature, the maximum being  $102^4/_{10}$  degrees. In the course of two days, the temperature had reached the normal. Confinement to bed; the application of iodine in the course of the vessels; enveloping the leg in sheet wadding, and over this a bandage just tight enough to keep the cotton in place, comprised the treatment. After the phlebitis had subsided and after the patient had been up several days, the right or injured leg was attacked on January 11. It ran a similar course, precisely the same symptoms were present, the same degree of elevation of temperature continued about two days, the maximum being  $102^4/_{10}$  degrees. For a week past, the patient has been up all day; walks from the bed to the chair on crutches with more or less assistance from the nurse. Enlargement of the superficial veins of the thigh was among the earliest symptoms. The enlargement still exists, but not quite so marked as at first.

In closing, I cannot too strongly emphasize the great value of radiography, both to the military and the civil surgeon, in revealing complications which would otherwise remain obscure and in locating foreign bodies. The use of the Röntgen ray has been beautifully illustrated in military practice in our late war with Spain, as set forth in the work prepared by the direction of Brigadier-General George M. Sternberg, Surgeon-General, and entitled "The Use of the Röntgen Ray by the Medical Department of the United States Army in the War with Spain."

# FRACTURE OF THE PELVIS.

A REPORT OF FIFTY-FOUR CASES.

BY THOMAS M. PAUL, M.D.,

OF HAZLETON, PA.,

ASSISTANT SURGEON, STATE HOSPITAL FOR INJURED PERSONS OF THE MIDDLE  
COAL FIELD OF PENNSYLVANIA.

THE occupations of people in certain localities continually expose them to the gravest traumatisms, and injuries will often be met with in these districts which are infrequent or even rare in other places. Iron working, lumbering, and mining are industries which are carried on frequently in small towns established solely for such purposes. Communities of this kind will therefore produce more cases of acute surgery than are seen among the same number of people in a large city. It is also true that many of these cases will be more grave and complex than those seen by the city surgeon. Hence, it is natural that many prominent writers, whose practice is confined almost solely to large medical centres, should speak of certain injuries as being unusual, which the surgeon in such smaller places considers common.

The miner or his laborer, while working a "breast" of coal, without a moment's warning, may be buried beneath tons of this material. When loosening coal by blasting it, he may be struck by a piece of rock from the "shot," which will produce the same effect as a missile from a fire-arm. The mule-driver in the mines may be squeezed between cars, between a car and a prop, or may have one of these vehicles pass over him. A drop through a shaft or a fall down a slope are privileges which are not denied the workman in the mines. It must be borne in mind that these dangers are rendered all

the more imminent by the fact that these men are surrounded by total darkness, save for the flickering lights on their caps, which may easily be extinguished, and thus aid in, or even cause, the accident. Above ground, too, the coal-breaker, with its complex and relentless machinery, as well as the numerous railroads running to and from the mines, furnish sources for injuries which are not surpassed, if equalled, elsewhere.

In his "Text-Book on Surgery" (Vol. i, p. 962), Agnew says that ninety-four cases of pelvic fracture were admitted to the Pennsylvania Hospital during a period of fifty-four years. Pilcher, in the "International Text-Book of Surgery" (Vol. i, p. 564), speaks of eighteen cases brought to the Methodist Episcopal Hospital, in New York, in nine years. This makes it appear that about two cases a year is the average number admitted to a large city hospital. The accompanying chart records fifty-four cases admitted to the State Hospital, Hazleton, Pennsylvania, in a little less than ten years; an average of over five cases per annum.

Pelvic fractures are almost invariably due to external violence delivered directly or indirectly upon some portion of the affected structure. A fall of a heavy weight upon the pelvis, the car-coupling accident, the passage of a heavy vehicle over the pelvis, a gunshot injury, or a fall, are the commonest causes.

The pelvic bones, like those of the skull and vertebral column, form a cavity containing delicate structures, and it is permanent disability or death due to injury of these viscera which the surgeon fears more than he does deformity or ankylosis from the fracture itself. Any of the pelvic bones may be broken, and multiple fractures are not unusual. According to some authorities, the pubis is the part most often affected; according to others, the ilium; at any rate, fractures of the ischium and acetabulum are uncommon, and of the sacrum and coccyx rare. The pelvic bones are strong and broad; it requires great force to break them, and for these reasons pelvic fractures are often comminuted. Compound fractures of

these bones are but infrequently met with, although five cases are herewith reported.

Ashhurst speaks of a complicated fracture as being one which is associated with some marked lesion of the same part of the body. In dislocations of the symphysis or fractures of the pubis, rupture of the urethra is very common; next in frequency comes rupture of the bladder, which may be extra- or intraperitoneal. Urinary extravasation accompanies the latter, and is often associated with the former, but retention is the usual sequel of urethral laceration. Cases of rupture of the rectum are rare; I am only able to report one. Rupture of the great vessels in the pelvis is probably more common than is suspected, the symptoms of internal hæmorrhage being ascribed to "shock." Contusion or rupture of the kidney is frequently associated with fracture of the ilium. I have met with two cases of luxation of the hip complicating pelvic fractures. Injuries to other parts of the body received at the time of the pelvic fracture, while not being complications in the sense in which Ashhurst uses the term, are such for purpose of convenience, and I have so classified them. The latter class of complications in some of the cases which I report are as grave as the pelvic injury itself.

I have seen but one case of fractured pelvis in the female (No. 52 in the tabulation). The young woman was watching an exhibition of fire-works, when a cannon burst, and a large fragment of metal entered the anterior abdominal wall just internal to the right anterior superior spine of the ilium, forming an enormous, irregular, contused wound of entrance; it passed out of the girl's body just above and anterior to the posterior superior spinous process, causing a wound of exit which was smaller and less contused than the first wound. The bottom of these wounds was formed in places by the transversalis muscle, in others by the subserous areolar tissue, and the anterior superior spine as well as almost the entire iliac crest behind it was carried away. The bone was trimmed so as to form an artificial crest and anterior spine, torn tissue and splinters of bone were removed, the wounds rendered as aseptic as possible and sutured. The bridge of tissue between



the two wounds—about three inches wide—retained its vitality, and, aside from considerable sloughing in the wound of entrance, the girl made an uneventful recovery. I saw the patient four months after she was discharged, and there was not the slightest loss of function. The chief surgeon of this institution, Dr. Lathrop, said, and I believe that he is right, that it was the resiliency of the ends of the woman's steel corset ribs which deflected the missile from its course and prevented it from entering the peritoneal cavity. The same cannon fragment, continuing in its course, struck a small boy, who died from intraperitoneal hæmorrhage.

Another interesting case (No. 51 in tabulation) was admitted to the hospital some little time before the former. The patient was a laborer in a coal-breaker, and his accident was caused by being caught in the "rollers." The rollers are two heavy cylinders of iron held some distance apart, and have spikes about two and one-half inches long projecting from their surfaces. When these cylinders rotate, the spikes or teeth of the upper roll pass between those of the lower one like a cog gearing, except that the teeth do not strike each other. The man attempted to lift a heavy rock out of the chute which fed these rollers with coal; his foot slipped, and he was drawn in as far as the lower portion of his abdomen before the machinery could be stopped. Examination showed that the teeth had pierced the right lower extremity in twenty places, producing multiple compound fractures of the leg and punctured wounds of the thigh which passed down on both sides of the femur. The spikes caused several punctured wounds of the left calf and bad lacerations of the scrotum and perineum. One of these projections struck the right horizontal ramus, causing a compound comminuted fracture; another pierced the lower portion of the inguinal canal, pushed the spermatic cord before it, and drew the right testicle into the external ring. This wound did not involve the peritoneal cavity, but it was enlarged under anæsthesia, in order to ligate several bleeding points and disengage the spermatic cord so as to draw the testicle into the scrotum. The wounds were cleansed from coal-dirt as well as possible

and dressed antiseptically. The right leg was placed in a fracture-box and sand-bags laid along both sides of the man's body. The patient suffered greatly from shock, soon rallied, and gradually made a complete recovery. When he left this institution his wounds were entirely healed, and he could walk without the slightest difficulty.

In instances like the above the diagnosis can be made visually; ordinarily, however, we have to depend on our senses of sight, touch, and hearing for the signs of deformity, undue mobility, and crepitus. Deformity is never well marked. Scudder, in his work entitled the "Treatment of Fractures" (p. 92), says, "practically all parts of the pelvic bones may be palpated." This, together with the context, would lead one to suppose that these bones may be felt with a degree of accuracy sufficient to render the existence or absence of a fracture a certainty. *In some cases it is easy to elicit abnormal mobility and crepitus; but in others, local tenderness is all that can be found. This statement is based on the result of several autopsies.* In the female, the vagina as well as the rectum may be resorted to for purposes of examining the interior of the pelvis, and I have no doubt it enables the surgeon to make a more extensive investigation; but I believe, in spite of this fact, that pelvic fractures can occur in the female and not be detected. The only case of fractured pelvis that I have seen in a woman is the one already described; and, since it was unnecessary to resort to vaginal examination in this instance, I cannot discuss the value of this means of diagnosis from a stand-point of experience. In cases where pressure over a portion of the pelvis elicits intense, circumscribed tenderness, I think it judicious to make a provisional diagnosis of contusion, but at the same time to resort to all the precautions necessary for the treatment of fracture. I have seen cases of fractured pubis dealt with in this manner show signs of undue mobility and crepitus several days after admission. The ways in which the signs of fracture may be sought after, and injury to the urinary tract determined, are too well known to require description.

FIFTY-FOUR CASES OF FRACTURE OF THE PELVIS TREATED IN STATE HOSPITAL FOR INJURED PERSONS OF THE MIDDLE COAL FIELD OF PENNSYLVANIA FROM FEBRUARY 25, 1891, TO FEBRUARY 5, 1901.

*All of these cases were males except No. 52.*

No. of Case	No. of Hospital	Initials.	Age	Nativity.	Occupation.	Etiology.	Diagnosis.	Complications.	Operation.	Result.	No. of Days in Hospital.
1	7	J. A.	42	Hungary.	Mine laborer.	Fall of rock.	Multiple fractures.	Rupture of bladder.	.....	Death.	5 hours.
2	30	J. S.	32	Hungary.	Mine laborer.	Caught between dipper of steam-shovel and a coal-car.	Comminuted pubis.	Pelvic abscess; retention of urine; pelvic injury, three years ago.	.....	Death.	6 days.
3	31	N. N.	17	Italy.	Mine laborer.	Fall of clay bank.	Comminuted pubis.	Rupture of bladder.	Laparotomy.	Death.	8 hours.
4	261	J. S.	42	Italy.	Miner.	Fall of rock.	Comminuted pubis.	Extensive perineal lacerations.	.....	Death.	1 hour.
5	330	V. P.	32	Poland.	Mine laborer.	Fell, landing on buttocks.	Simple fracture of ischium.	Simple fracture of humerus;	.....	Death.	1 day.
6	379	P. D.	18	United States.	Brakeman.	Caught between cars.	Complete crush.	Simple fracture of humerus; crushed toes; left kidney contused.	.....	Death.	1 1/2 hour.
7	400	J. S.	27	Poland.	Miner.	Fall of rock.	Compound fracture of left ilium.	Compound fracture of left femur.	.....	Death.	2 hours.
8	439	F. F.	30	Hungary.	Mine laborer.	Fall of rock.	Right horizontal ramus.	Contusions of ischia.	.....	Death.	1 day.
9	444	A. H.	27	Hungary.	Mine laborer.	Cave-in.	Right ilium.	Fracture of left scapula and right ulna.	.....	Cured.	41 days.
10	451	J. M.	25	Hungary.	Mine laborer.	Fall of rock.	Left horizontal ramus.	Ruptured bladder; extravasation of urine.	Laparotomy	Death.	1 day.
11	458	A. W.	16	Germany.	Brakeman.	Knocked down by locomotive.	Pubis.	Ruptured urethra; contused extremities.	.....	Death.	2 days.
12	467	J. B.	38	United States.	Brakeman.	Caught while coupling cars.	Comminuted pubis.	Contused abdominal viscera.	.....	Death.	1 day.
13	506	S. K.	38	Hungary.	Mine laborer.	Struck by blast of rock.	Left ilium and ischium.	Scalp wound; lacerated wound of knee-joint.	.....	Death.	7 hours.
14	580	D. B.	27	United States.	Brakeman.	Caught under cars.	Crest of left ilium and rim of acetabulum.	Crushed left foot; dislocation of left hip.	.....	Death.	1 day.
15	585	M. P.	31	Hungary.	Mine laborer.	Caught between car and prop.	Both iliac crests.	.....	.....	Cured.	56 days.
16	664	C. M.	26	United States.	Miner.	Fall of coal.	Right iliac crest.	.....	.....	Cured.	40 days.
17	859	C. M.	25	United States.	Miner.	Fall of coal.	Comminuted pubis.	Rupture of bladder.	Laparotomy.	Death.	3 days.
18	971	H. B.	44	United States.	Mine laborer.	Caught between car and prop.	Both iliac crests.	.....	.....	Cured.	65 days.
19	1004	L. J.	30	Hungary.	Miner.	Run over by car.	Multiple fracture of left innominate.	Fracture of both bones of right leg and fracture of left femur.	.....	Death.	4 hours.
20	1018	J. M.	17	Hungary.	Mine laborer.	Caught between car and prop.	Femoral head driven through acetabulum.	.....	.....	Death.	4 days.
21	1080	F. K.	25	Hungary.	Mine laborer.	Caught between two cars.	Left horizontal ramus.	Fracture of left clavicle.	.....	Cured.	41 days.

2711039	P. S.	Italy.	Mine laborer.	Fall of rock.	Left iliac crest.	.....	.....	.....	42 days.
271184	J. K.	Poland.	Miner.	Dragged by runaway car.	Compound fracture of right iliac crest.	.....	.....	.....	34 days.
241205	M. D.	Hungary.	Mine laborer.	Rollled between car and side of gangway.	Left ilium and ischium.	Rupture of urethra.	External urethrotomy.	Death.	2 days.
251256	A. R.	Poland.	Miner.	Knocked down by cars.	Both ilia.	Contusion of right face and head; fracture of left tibia.	.....	Cured.	65 days.
261277	J. O'D.	United States.	Brakeman.	Fall of coal.	Crest of left ilium.	.....	.....	Cured.	41 days.
271327	A. K.	United States.	Mule driver.	Fall of coal.	Left horizontal ramus and left ilium.	Bad contusions.	.....	Im-proved.	21 days.
281413	F. T.	Italy.	Mine laborer.	Fall of rock.	Left ilium.	.....	.....	Cured.	62 days.
291546	A. B.	Hungary.	Mine laborer.	Squeezed between cars.	Both ilia and both ischia.	Ruptured urethra.	External urethrotomy.	Death.	2 days.
301553	M. S.	Hungary.	Mine laborer.	Fall of rock.	Simple fracture of pubis.	Dislocation of left hip and dislocation of right knee.	.....	Cured.	28 days.
311675	J. H.	Hungary.	Mine laborer.	Fell down mine-shaft.	Left ilium.	Ruptured urethra.	.....	Death.	46 days.
321791	J. W.	Poland.	Miner.	Fall of coal.	Simple fracture of pubis.	.....	.....	Cured.	36 days.
331835	J. B.	Hungary.	Mine laborer.	Struck by trolley-car.	Right iliac crest.	.....	.....	Cured.	25 days.
341829	P. D.	Ireland.	Miner.	Fall of coal.	Simple fracture of pubis.	.....	.....	Cured.	45 days.
351887	M. M.	Hungary.	Mine laborer.	Fell into cave, striking buttocks.	Both ischia.	.....	.....	Cured.	35 days.
362016	A. S.	Poland.	Miner.	Fall of coal.	Right iliac crest.	.....	.....	Death.	2 days.
372040	J. H.	Hungary.	Mine laborer.	Fall of coal.	Comminuted symphysis.	Ruptured urethra.	.....	Death.	1 day.
382220	M. S.	Poland.	Miner.	Fall of coal.	Simple fracture of pubis.	Necrosis.	Dead bone removed.	Cured.	50 days.
392235	B. R.	Poland.	Mine laborer.	Shot at Latimer strike.	Left horizontal ramus.	.....	.....	Cured.	667 days.
402242	J. F.	Poland.	Mine laborer.	Shot at Latimer strike.	Multiple fractures.	Severe hæmorrhage.	.....	Death.	8 hours.
412293	P. McN.	United States.	Mine laborer.	Fall of coal.	Right ilium.	Rupture of right kidney.	.....	Death.	25 days.
422384	M. C.	Hungary.	Mine laborer.	Squeezed between cars.	Simple fracture of pubis.	Internal hæmorrhage.	.....	Death.	29 days.
432458	J. P.	Hungary.	Miner.	Fall of rock.	Simple fracture of pubis.	.....	.....	Cured.	56 days.
442795	J. M.	Poland.	Mine laborer.	Fall of coal.	Simple fracture of coccyx.	.....	.....	Cured.	31 days.
452752	A. D.	United States.	Mine laborer.	Explosion in mines.	Simple fracture of pubis.	Ruptured urethra.	External urethrotomy.	Im-proved.	93 days.
462861	G. M.	Hungary.	Miner.	Fall of rock.	Comminuted pubis.	Ruptured bladder and rectum.	Laparotomy.	Death.	1 day.
472902	J. O'D.	Scotland.	Mule driver.	Fell down mine-shaft.	Left ilium.	Ruptured urethra; fracture of right tibia and fibula.	External urethrotomy.	Cured.	22 days.
483950	G. B.	Hungary.	Mine laborer.	Fall of coal.	Simple fracture of pubis.	Lacerated perineum; severe hæmorrhage.	Intravenous transfusion.	Cured.	97 days.
493082	G. M.	Hungary.	Mine laborer.	Fall of coal.	Compound fracture of pubis.	.....	.....	Death.	1 day.
503112	J. S.	United States.	Mine inspector.	Knocked down by car.	Right iliac crest.	.....	.....	Cured.	39 days.
513170	G. P.	Hungary.	Laborer in breaker.	Caught in rollers in breaker.	Compound fracture of pubis.	Lacerated perineum; multiple compound fractures of right leg.	Laparotomy.	Cured.	42 days.
523244	M. R.	United States.	Mill girl.	Bursting of cannon at fourth of July exhibition.	Compound fracture of right iliac crest.	Immense wounds of entrance and exit.	Wounds sutured.	Cured.	89 days.
533286	J. W.	Hungary.	Miner.	Fall of rock.	Simple fracture of pubis.	Ruptured urethra.	.....	Death.	4 days.
543384	J. P.	Poland.	Miner.	Fall of rock.	Simple fracture of pubis.	Ruptured urethra; urethral fever.	.....	Cured.	22 days.

The prognosis in all cases should be guarded; in some instances the grave complications preclude recovery from the beginning. The cases reported show a mortality of fifty per cent.; twenty-five cases recovered and two were improved. Many of these patients died from the injuries associated with the pelvic fracture.

Simple uncomplicated cases of fractured pubis require rest in the recumbent position, with pressure so exerted as to keep the fragments in apposition. Dennis, in his "System of Surgery" (Vol. i, p. 571), advises the use of Liston's long splints. I have no doubt that good results can be obtained by this means, but at the same time am more in favor of long sand-bags. The latter can be adjusted to the form of the patient's body, require no displaceable padding, and are kept in position by their own weight. Broad pieces of muslin passed around the patient's body and sand-bags will aid in keeping the injured part at rest. If the pubic fracture be complicated with laceration of the urethra, a catheter should be tied in this canal for several days. J. William White, in any condition which requires the introduction of a sound or catheter, first injects the urethra full of sterile olive oil. In cases of injury to the urethra, the oil, when injected, will distend the mucous lining, press torn tissue into place, and lubricate every portion of the canal. Should the catheter be inserted in the ordinary manner, the greater portion of the lubricant is wiped off the instrument by the external meatus. A soft rubber catheter should be tried first, and, should it fail to reach the bladder, success may be attained by the use of a silver instrument. Care should then be taken to keep its point pressed rather firmly against the urethral floor while it passes under the symphysis, as the urethral roof is often the only part torn. This operation should be done under the most minute aseptic precautions, and the instrument should be kept in for several days by tapes and adhesive straps. This will keep torn pieces of mucous membrane pressed into place, obviate retention of urine, and minimize the likelihood of subsequent stricture. It

is needless to emphasize the folly of using force in catheterization. Should it be impossible to introduce the catheter, an external urethrotomy should be performed.

If the bladder is ruptured into the peritoneal cavity, a laparotomy should be done immediately and the rent sutured. If the rupture is extraperitoneal, the bladder should be constantly drained, urinary antiseptics, such as salol and boric acid, administered, and early free incisions made to relieve extravasation. Some cases, especially those in which other portions of the body are injured, will be attended with so much shock as to absolutely contraindicate all operative procedures.

In some cases of fractured ilium the fragments remain in apposition themselves, in others reduction cannot be maintained. Should the broken fragment become united in its abnormal position, loss of function or apparent deformity rarely result. Unless a fragment of the ilium has a tendency to be displaced outward, which is unusual, broad bands of adhesive plaster or muslin should *not* be drawn around the pelvis.

In Hamilton's "Treatise on Fractures and Dislocations," edited by Stephen Smith (p. 340), the following statement is made regarding the treatment of fractures of the ischium: "The posture best suited to these cases will be indicated usually by the sensations of the patient himself." In some of these cases it is impossible to prevent the fragment from becoming united in an abnormal position, but the patient usually escapes deformity and loss of function.

If the head of the femur be driven into the pelvic cavity, death is the usual result. The diagnosis in the case which I report was made at autopsy. Should the upper portion of the acetabular rim be broken off, the head of the femur should be restored to its cavity and extension applied.

It is difficult to prevent forward displacement of the lower end of the sacrum when this bone is broken. It is desirable, for obvious reasons, to avoid inserting packing or cannulas into

the rectum to prevent this displacement. Should I meet with such a case, I would try the effect of Malgaigne's hooks, or a modification thereof, applied to the back of the sacrum. Fracture of the coccyx usually only requires rest for its treatment. Should coccygodynia be a result of this injury, excision is demanded.

## A NEW KNOT-TIGHTENER.

By HUGO EHRENFEST, M.D.,

OF ST. LOUIS, MO.

AMONG the objections urged by the opponents of the vaginal route in operating, one of the weightiest is the difficulty of controlling hæmorrhage by means of ligatures per vaginam. They claim that in most cases it is difficult, and in many impossible. It is beyond controversy that the field of operation in vaginal surgery is both narrow and deep. It is often impossible to hold both ends of the ligature with clinched hands in order to tighten it, as we do in an open field. The usual method adopted by operators to overcome this inconvenience of the narrow vaginal field consists in the following:

Both ends of the ligature are grasped some distance from the knot; the index-fingers, being extended, are pushed in the angle formed by the knot, so that the points of the fingers rest close to the knot; the balls of both hands are brought together, and now, in order to tighten the knot, the apices of both index-fingers are separated (as shown in Fig. 1).

The more frequent disagreeable consequences of this procedure consist in secondary hæmorrhage as the result of insufficient tightening of the ligature, in frequent breaking of the thread, in incised wounds to the forefingers of the operator, due to the tension which has to be employed. These difficulties naturally occur oftener to operators who prefer the vaginal route on account of its many advantages, even in cases where larger fibromas or ovarian cysts are to be removed.

In contradistinction, the views expressed by my former chief, Professor Schauta, of Vienna, an expert in all questions of vaginal surgery, are, that since he has adopted the knot-tightener suggested by me (*Centralblatt für Gynäkologie*, 1898,



No. 4), he meets with no difficulty in controlling hæmorrhage.<sup>1</sup> The favorable notice given this instrument by Professor Schauta, and latterly by Professor Macnaughton Jones, of London, besides my personal experience with it, has induced me to call the attention of my American colleagues to it.

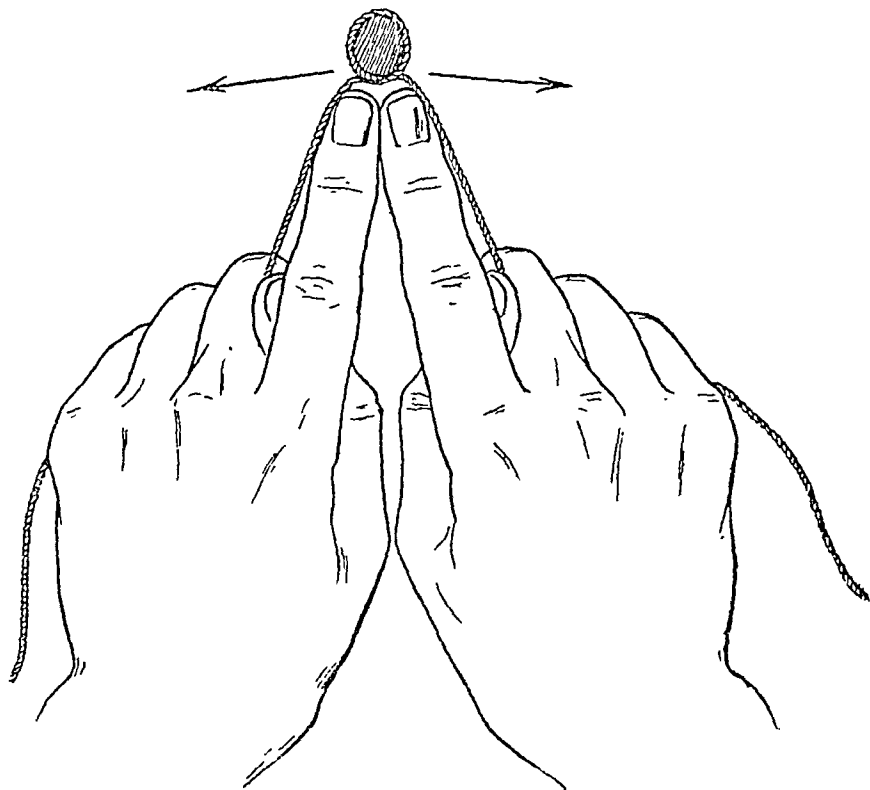


FIG. 1.—Showing method of tying knot.

The main difference between my instrument and other knot-tiers and knot-tighteners so far presented to the profession is in the fact that it automatically holds securely both ends of the ligature, and in all other respects imitates exactly

<sup>1</sup> In *Archiv für Gynäkologie*, Vol. lix, p. 113, he says: "The greatest difficulty in properly adjusting ligatures is offered by those high up in the infundibulopelvic ligaments. But since I employ 'Ehrenfest's Knot-tightener' for tightening these ligatures, placed high up in the pelvis, I consider even this difficulty as entirely removed."

Gynæcological and Obstetrical Society in Vienna, Session of June 20, 1899. "The technique (of controlling hæmorrhage during vaginal panhysterectomy) has to be learned. But during the last two years, while using 'Ehrenfest's knot-tightener,' no case of secondary hæmorrhage after vaginal panhysterectomy occurred in my work."

the mechanism employed by the hands in tightening a knot (as illustrated in Fig. 1).

It consists of two levers (B and B<sub>1</sub>) attached by means of the hinge, A, in about the middle of their length, resembling a glove stretcher. The flat spring, C, attached to the lower end of one of the handles and pressing against the other, keeps the points of the levers in closed apposition. On the top of each lever is a groove (D and D<sub>1</sub>) to admit both ends of the ligature. Below the hinge, A, and between the handles the mechanism which automatically holds fast the two threads is placed. It consists of two small blocks (F and F<sub>1</sub>) which are movable around their axes (E and E<sub>1</sub>). The portions approximating each other are made eccentric in shape. These are pressed close together by means of a small spring placed below the small blocks (not to be seen in the cut). On account of the diameters of these eccentric blocks increasing in the downward direction, it is only possible to turn them around their axes in the same downward direction. An upward motion causes them to lock each other tightly. This mechanism produces the result that a thread placed between these eccentric blocks can be easily pulled downward, due to the ability of the blocks to turn in a downward direction. But should tension be applied to the thread in a reversed direction, their eccentric shape causes them to immediately approach and lock each other. By this means the thread is automatically held fast. It is impossible to pull the

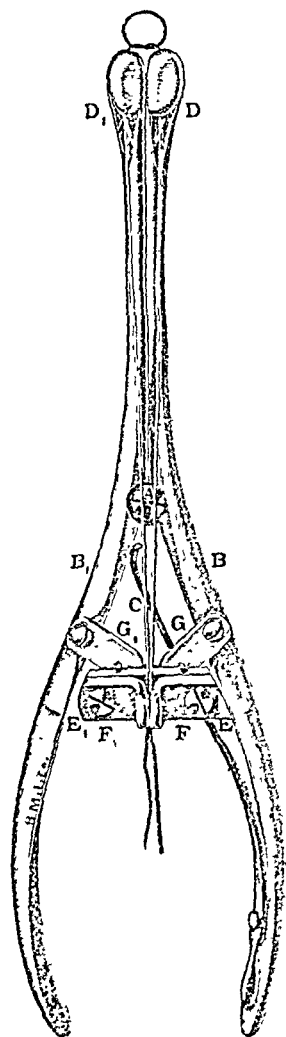


FIG. 2.—Reproduction of the Ehrenfest instrument.

thread upward when placed between these blocks. Should, however, these results not be obtained, it is an indication of faulty workmanship in the construction of the instrument. The two axes ( $E$  and  $E_1$ ) are mounted in a small plate, hinged in the middle and joined to both handles by means of the levers  $G$  and  $G_1$ .

The following is a description of the *rationale* of this instrument and the necessary instructions for using it.

By means of a long aneurism-needle we pass the thread around the blood-vessel or through the ligament, being guided by the eye in passing same. We tie a surgical knot and tighten it as high up as we can by means of the fingers. In order to complete the tightening of the ligature, we now make use of the instrument. The handle is grasped with the right hand, the two ends of the ligature with the left. We introduce the tips of the instrument between the two ligatures, so that each end is contained in either groove ( $D$  and  $D_1$ ). Both ends of the ligature are now pressed between the two eccentric blocks as seen in Fig. 2. We begin to press the handles of the instrument together, which produces the following result. The tops of the levers begin to separate, causing the thread to become tense, and at the same time exert an upward pull on the parts of the thread, situated between the grooves and the fixation blocks, forcing them to come together. This fixes the ligature. Continued pressure on the handles increases the tension of the ligature, and, as the tops separate the more, slack of ligature is taken up, thus tightening the knot. The pull on the knot is directed in the most favorable direction, namely, at the tangent, as is done with the forefingers, as shown in Fig. 1. As the handles approach each other, the whole fixation mechanism moves *in toto* downward, and thus stretches the threads. This is a considerable advantage. A wet silk ligature is very elastic. The force applied does not produce its effects on the knot before the limit of the ligature's elasticity is reached. By means of this downward movement of the whole fixation mechanism, the elastic thread is somewhat stretched without causing any surplus separation of the lever

tops, a point to be taken into consideration on account of the narrowness of the field of operation. The ability of the mechanism to allow a thread to pass downward, but not upward, adds the following great advantages. Should extreme narrowness exist to such an extent as to only permit the separating of the lever ends to a small degree, or if we deem that the complete pressure of the handles is not sufficient to attain a complete tightening of the knot, we can very easily readjust the threads in the instrument. By removing the pressure of the hands on the handles, the spring, C, brings the lever ends together. The thus loosened threads we can stretch by simply pulling them through the eccentric blocks downward. After this is accomplished, we can immediately further tighten the knot by again pressing the handles. This procedure can be repeated as often as is required.

Practice with this instrument teaches one to judge when the maximum amount of tightening is reached. The feel imparts this fact. A very simple way for one to keep himself informed as to the force employed while tightening the ligature, is to make use of a finger of the left hand in feeling that part of the thread situated between the grooves at the top and the fixation blocks. When we find that we have reached the limit, we release the pressure on the handles and remove the threads by pulling them from between the fixation blocks *in a downward and outward direction*. The second turn of the knot we tighten simply by means of the fingers; but we can do so readily with the instrument should the occasion demand it.

If we overlook the moment when extreme tightening is reached, the thread naturally breaks. Usually this occurs where it was held between the eccentric blocks, and if such be the case, the ends are long enough to take the second turn in completing the knot.

This instrument was devised especially for silk ligatures, and is not practicable when catgut is used, since the fixation blocks destroy the integrity of such soft material. It is necessary for ligatures to be at least from seventeen to eighteen

inches long in order to make use of this instrument, and therefore it can hardly be employed if silkworm-gut ligatures are used.

In conclusion, I would add that this knot-tightener is used by the operator without the help of an assistant; it is simple to handle, and insures the certainty of tightening a ligature to its maximum tensity even in very unapproachable places. It thus gives security against secondary hæmorrhage in vaginal surgery, and also it proves useful in abdominal work when we are called upon to tighten a ligature deep down in the pelvis.

# THE VALUE OF THE X-RAY IN SURGERY.

By J. RUDIS-JICINSKY, M.D.,

OF CEDAR RAPIDS, IOWA.

As the value of the application of the X-ray in surgery and medicine seems to engage the attention of the profession, and a variety of opinions are entertained as to its true character and proper results, I desire in this communication to describe and illustrate certain cases which are both interesting and important. In these actual cases the surgeon's responsibility was serious, and grave consequences would have resulted from errors in diagnosis. The X-ray proved to be the best means of diagnosis in these cases, and with the latest accessories gives us a method for the photography of the invisible which is absolutely reliable and indispensable for securing accurate skiagraphs, entirely eliminating the elements of distortion. Very early in the history of the X-ray, it was found that we had to deal only with the shadow, with all the limitations which the term implies. The disappointments which followed its application in many cases were due to the lack of proper technique, knowledge of the apparatus, and management of each given case. As long as it is borne in mind that we are dealing with a shadow not only treacherous, but which may be easily exaggerated or changed by position, surgeons will always try to have the proper proof that the subject was placed in a certain definite position, and not only one but more skiagraphs will be taken from different points in each case, and the injured part will be compared with the normal one, if the most useful record of our procedure before, during, and after the treatment of our cases is to be secured. All this may be done through the dressings of the injured part, without any pain or discomfort to the patient: through plaster of Paris.

through the clothes, regardless of any swelling or inflammation which may mask the real condition, and without general anæsthesia. How often is the operation really of secondary importance as compared with the dangers of anæsthesia? The foreign body is found without the dangerous probe, the dislocation or fracture diagnosed correctly without the painful manipulation, the growth of the callus may be observed, the approximation of the fragments may be seen, fissure fracture recognized, and in diseases of the bones the real cause may be found.

In illustration of the value of the X-ray in diagnosis, I submit the following cases:

CASE.—*Injury at Hip, demonstrated after Five Years of Treatment, for Coxalgia to be One of Dislocation of Head of Femur.*—Miss A. R., aged eighteen years. Some years ago, always being in good health, she slipped on the steps of her house. She did not mind it very much at first, suffering pain, but not very badly. In a few days the pain became aggravated and a physician was called, who diagnosed the condition as one of coxalgia, and treated it accordingly. Now, after the lapse of five years, the girl's health being excellent, there is a shortening of the limb of two-and-a-half inches. An X-ray examination demonstrated the existence of a dislocation of the head of the femur, and absolutely no disease of the bones. (See Fig. 1.) This skiagraph shows the details plainly and the internal structures of the bones. The negative is still better.

In X-ray work, by proper technique and patience, unexpected results are sometimes obtained. It is not the machine or the tube which are always to blame, but sometimes ourselves. In the following case I had made five long exposures, and the results were always negative. Then I changed my procedure, remembering that the subject to be photographed must be as near as possible to the plate. Instead of minutes of exposures, I made it seconds, and succeeded. It is very hard to find always the necessary length of exposure, each individual case being different; if the exposure is prolonged, the negative will

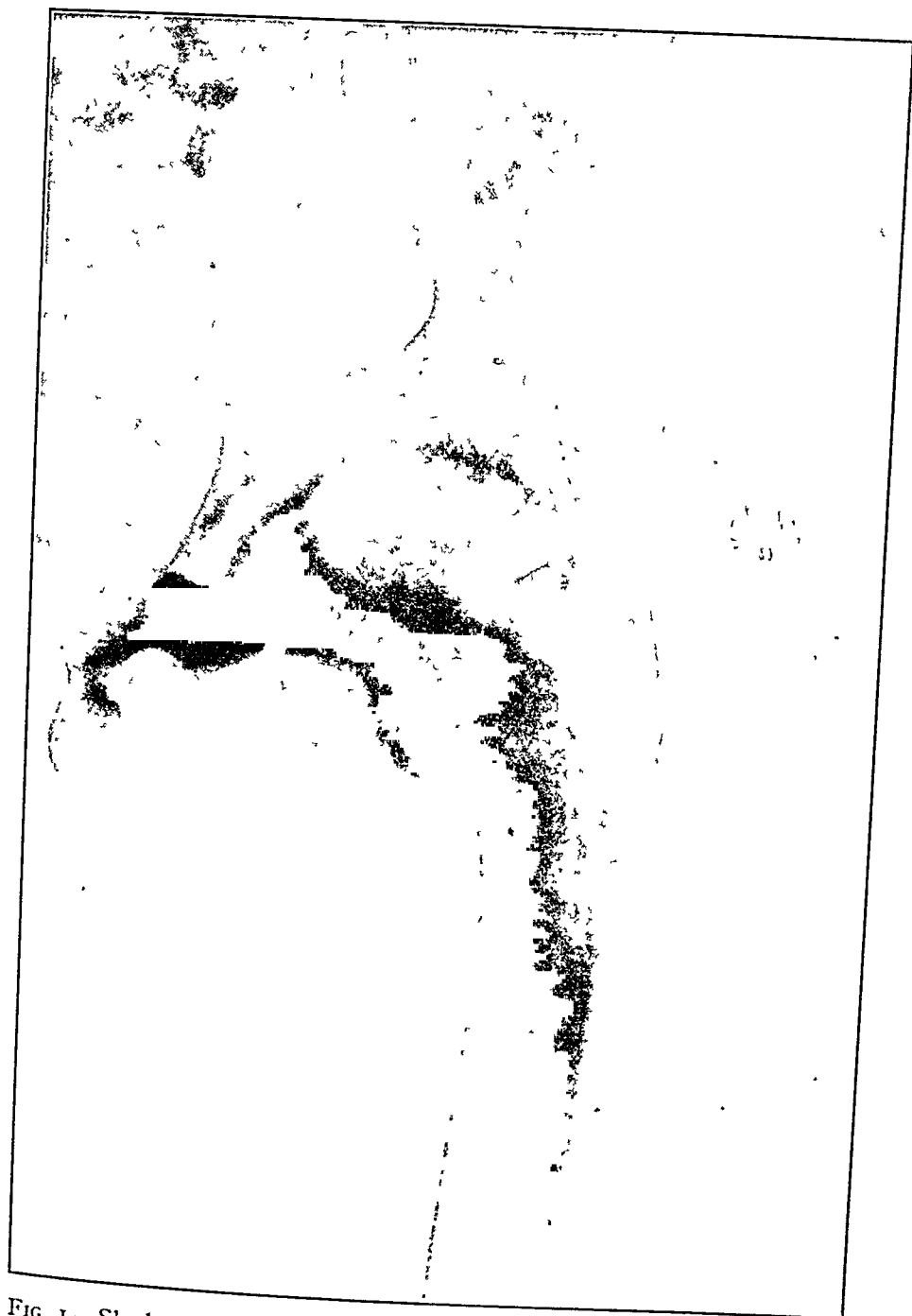


FIG. 1.—Shadows and substance of the bones; dislocation of the head of femur: no disease of the bones







FIG. 2.—Showing two gall-stones,—one oval, the other elliptical.





FIG. 3.—Clot under the parietal bone at the sagittal suture on the left.



be foggy; if one does not expose quite long enough, the result may be negative.

CASE II.—Mrs. A. M., aged thirty-four years, with a history of acute attacks of cholecystitis, with marked jaundice. Case diagnosed in the beginning as appendicitis; later on carcinoma of the liver; and, finally, as simple jaundice. She was submitted to X-ray examination for gall-stones. Temperature at this time was 100° F.; pulse, 120; weight, 101 pounds; height, five feet one inch. Very thin. Five exposures negative. The sixth one in fifty seconds, at forty-two degrees, tube being two-and-a-half feet from the body, and the plate right under, revealed two gall-stones, one oval and the other one elliptical in form. The case was operated on a week later, and the diagnosis verified by the removal of the two gall-stones. The round one contained phosphates only, the other one had a nucleus of cholesterine with phosphates around. (See Fig. 2.) The skiagraph of the right side of the body shows the outline of the ribs, vertebræ, and pelvis. The negative is also better in this case.

In the following case the symptoms were obscure and pointed to a non-operative line of treatment, but the X-ray proved the necessity for operation.

CASE III.—J. F. B., aged thirty-nine years; sunstroke six years ago. Since that time had complained of dull, persistent headache on the left side of the head; changed disposition, was irritable, had vertigo, dyspepsia, vomiting, soon followed by slight palsies, but no convulsions. Lately, retention of urine and symptoms more obscure. The tone of the muscles and intellection were unimpaired. With the parts of the head not examined covered with stanniol and those exposed oiled for protection, the X-ray revealed under the parietal bone at the sagittal suture on the left a large epidural clot. (See Fig. 3.) The clot, amounting to four ounces, was removed, and recovery followed in three weeks, without any complication.

The following case was diagnosed as primary lateral sclerosis, acute myelitis, and, finally, spinal meningitis, until its true nature was demonstrated by the X-ray.

CASE IV.—B. P., aged twelve years. Very gradually developed increasing feeling of weakness in his limbs and some stiffness of the muscles. Occasionally there occurred brief flexor spasms, drawing the legs up. The knee-jerk was greatly exaggerated. Sensation unaffected. As the morbid process progressed, a curvature of the spine resulted in a few years. Electro-contractility not impaired. The real condition not being recognized early, the treatment was most unsuccessful. On X-ray examination, destruction of the bony substance of the vertebræ was demonstrated instead of disease of the lateral white columns or anterior horn of the cord. The changes, being tubercular without doubt (see Fig. 4), were marked most beautifully not only in the bodies of the vertebræ, but in the processes also. It may be that interstitial hyperplasia of the connective tissue and the atrophy of the nerve elements were present too, but the real cause was found in the bones, a condition of affairs which could not be made out by another means of diagnosis. So far I have not yet seen a picture so clear and good as this one is.



FIG. 4.—Destruction of the vertebræ and processes, tubercular and curvature.





# TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

*Stated Meeting, January 23, 1901.*

CHARLES K. BRIDDON, M.D., in the Chair.

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## HYDATID OF THE PROSTATE.

DR. L. BOLTON BANGS presented a man, thirty-nine years of age, upon whom he had operated for a tumor of the prostate. For the history and details of this case, see page 565.

DR. F. LANGE, after examining Dr. Bangs's patient, said that the prostate was enlarged and fairly regular in its outline. It was somewhat elastic, but there was no fluctuation. The wall of the original tumor or cyst which Dr. Bangs described has apparently shrunk, and now corresponds to the wall of the prostate, leaving the latter still enlarged. The tumor seems to have originated in the prostate.

## COLITIS TREATED BY VALVULAR COLOSTOMY AND IRRIGATION.

DR. PERCY R. BOLTON presented a man, forty-two years old, married, a carpenter by occupation. His family history was negative; the patient denied a venereal history, and had always enjoyed good health up to the onset of his present illness.

Eight weeks before his admission to hospital, he was taken suddenly ill with vomiting and diarrhoea. The vomiting ceased after twenty-four hours, but the diarrhoea persisted; the stools consisted chiefly of mucus and blood, and contained comparatively little faecal matter. There was marked tenesmus, and the stools were very frequent, as often as once every ten minutes. He had lost thirty-one pounds in flesh, and was much emaciated and very anæmic. Upon his admission to hospital, his temperature was 97.8° F.; pulse, 104; respirations, 20. His bowels moved from sixteen to twenty-three times daily; the stools contained much

pus and mucus and a few red blood-cells; no amœbæ coli. A rectal examination of the lower fourteen inches of intestine with Kelly's speculum showed that the mucous membrane was studded with numerous small ulcers.

Dr. Bolton said that, following a suggestion made by Dr. Gibson, he determined to treat this case by irrigation through a valvular fistula of the cæcum, made in the same manner as that commended by Kader, and so successfully practised in the formation of gastric fistulæ; thus avoiding the discomforts attending the presence of an artificial anus. The abdomen was opened on the right side by a one and one-half inch incision parallel with and to the inner side of the outer end of Poupart's ligament. After uniting the skin and peritoneum with sutures of fine chromated gut, the cæcum was drawn into the wound and held there by two silk ligatures which were passed through its serous and muscular coats, one on each side. A good-sized catheter was inserted into the cæcum, and the intestinal wall infolded about it by three superimposed tiers of Lembert sutures, the ends of the last set being passed through the abdominal wall and tied, fixing the cæcum securely. Sutures of silkworm were placed at each end of the wound.

After the operation the patient was put on a proteid diet. He was given a certain amount of salol every day, together with castor oil. The intestine was irrigated twice daily through the catheter, a 1 to 10,000 silver nitrate solution, followed by a saline solution, being employed. After the seventh day the catheter was removed and introduced at the time of irrigation only, the valvular action of the opening into the gut being perfect, allowing no escape of fluid. Under this treatment, the blood, pus, and mucus disappeared from the stools, and at the end of two weeks the ulcerations of the intestine had healed. The number of the stools was reduced to one to three daily, and the man rapidly increased in weight. He was discharged cured after four weeks. At that time his stools were practically normal. Twelve days after he left the hospital his colostomy wound closed spontaneously. He has a slight ventral hernia at the site of the operation. In order to avoid the occurrence of this in future cases, Dr. Bolton said he intended to employ the intramuscular incision. It was not employed, in this case for fear the opening would close too promptly.

## ECHINOCOCCUS OF THE LIVER.

DR. ELLSWORTH ELIOT, JR., presented a woman, thirty-nine years old, who was admitted to the Presbyterian Hospital on June 8, 1900. She stated that fifteen months before she began to suffer from abdominal pain, with loss of flesh and strength. A year ago she was admitted to the hospital, and her case was diagnosed as one of cyst of the liver, but she refused treatment. Five weeks ago she began to develop very severe pain in the right side of the abdomen; this pain was constant, and increased upon lying down or deep inspiration. When in the recumbent position there was some dyspnoea. There was marked loss of flesh and strength. The patient at times suffered from nausea, with occasional vomiting, particularly upon lying down.

When the patient entered the hospital, her chief complaint was the pain. She was extremely emaciated and very weak. There was marked bulging of the lower right chest anteriorly and in both axillæ, more pronounced on the right side. There was also distinct tenderness in the right axilla anteriorly and over the lower region. Percussion showed flatness over the right lung anteriorly, from the third rib to the base, with absence of breathing sounds over same area. Posteriorly, there was flatness from the angle of the scapula to the base, and on the left side from a point just below the angle to the base. Vocal fremitus and breathing sounds were absent on the right side, and much impaired on the left side. The right chest, just below the nipple, measured one and three-quarters inches more than the circumference of the corresponding portion of the left chest.

Palpation of the abdomen revealed a tumor, the lower border of which was at a level with the umbilicus. This area was dull on percussion and elastic to the touch. The corresponding portion of the abdomen was rigid, especially the upper half. There was some œdema of the lower extremities. The urine contained 3 per cent. of albumen (by volume), with many granular casts. These disappeared after the operation.

Operation, June 8, 1900. A vertical incision, two and one-half inches long, was made over the right lobe of the liver, from the upper border of the ninth costal cartilage downward. The surface of the liver was found to be firmly adherent to the parietal peritoneum. An exploring-needle was inserted, and revealed the

presence of turbid fluid. The opening along the needle was enlarged, and several quarts of fluid containing many spherical transparent globules were slowly evacuated without any appreciable effect on the pulse. The cavity, when emptied, was eleven inches in anteroposterior diameter. It was washed out with hot saline solution and drained with a large rubber tube.

Subsequent to the operation, the patient's temperature never went above 101.5° F., and reached normal in three weeks. The pulse ranged between 80 and 100. There was no nausea or vomiting. The patient felt disinclined to take any nourishment for some time after the operation. The dressing was changed daily, the cavity being irrigated with saline solution and creolin. In the intervals, siphon drainage was employed, and the bed was raised so as to favor free drainage.

Notwithstanding a very copious discharge, the patient's general condition gradually improved and she made an excellent recovery, which was retarded only slightly by a collection of fluid in the right side of the chest; this was aspirated on July 26, twenty-five ounces being removed.

A microscopic examination of the cyst contents revealed pus, leucocytes, and echinococcus hooklets.

### A TRAUMATIC TORTICOLLIS.

DR. ROYAL WHITMAN presented a boy who, he said, was the same case which had been presented for diagnosis by Dr. Dawbarn at the meeting of the Surgical Society on December 26 last. The boy, last October, received a blow from a stick upon the side of the jaw, producing a small wound, which was dressed by the family physician. At this time the boy's mother noticed that his head was strongly deviated towards the left. Six weeks later the patient was seen by Dr. Dawbarn, who, on account of this marked lateral deviation of the head and the presence of a bony protuberance posteriorly, was inclined to regard the case as one of fracture or dislocation of the atlas.

In the discussion of the case when it was first presented, Dr. Whitman said he did not think the case was one of fracture or dislocation of the atlas, but rather that it was a case of traumatic or spasmodic torticollis, and Dr. Dawbarn thereupon referred the patient to him for treatment. This consisted in the

application of a plaster jacket and jury-mast to support the head, combined with manual stretching of the contracted muscles and exercises. Under this treatment there has been marked improvement in position and control of the head, and complete relief from the pain. There is still some spasm of the posterior group of muscles on the right side, but motion is free and painless in other directions. The bony prominence posteriorly, which was probably due to a twisting of the atlas, has almost entirely disappeared. There was also some enlargement of the thyroid, which has also improved; this was probably the result of congestion caused by the malposition of the head.

### ABSCESS OF THE LIVER.

DR. THEODORE DUNHAM presented a boy, five years old, who had enjoyed perfect health until last August, when he began to complain of loss of appetite. This was followed soon by rapidly developing jaundice of a very intense type. Pressure in the right hypochondrium elicited a good deal of tenderness, and this was also quite pronounced when he yawned. He visited a dispensary, where his case was diagnosed as one of typhoid fever. His jaundice persisted for about two months, as did also the pain, and a physician who saw him at that time pronounced the case one of appendicitis. He was then taken to Dr. Max Einhorn, who discovered a tumefaction in the region of the liver, and suspected that the case was one of abscess of the gall-bladder or cholelithiasis. The patient was referred to the Babies' Wards of the Post-Graduate Hospital, where Dr. Dunham saw him together with Dr. Chapin. A tumor situated about the region of the gall-bladder was plainly perceptible to the touch and slightly so to the eye. While the child was under observation his temperature fluctuated greatly, ranging from 99° to 105° F.; his pulse from 100 to 165; his respirations were not particularly increased. An examination of the blood showed a leucocytosis of 21,800, and the blood contained a number of leucocytes which gave the iodine reaction. The speaker said this convinced him that pus was present, but its exact location was uncertain.

An incision was made over the site of the tumor, and after breaking up some frail adhesions the gall-bladder was found to be apparently normal. The exposed portion of the liver was then stitched to the outer tissues and the wound packed with gauze

until the following day, when, under ether, an aspirating-needle was inserted into the liver, and at a depth of three-quarters of an inch it entered a pus cavity. The opening was thereupon enlarged and disclosed an abscess cavity about an inch by half an inch in size. After evacuating it, it was irrigated with peroxide of hydrogen through a large drainage tube, which was left in for fifteen days. The patient made an excellent recovery, and his subsequent history was uneventful.

The pus from the abscess cavity was examined by Dr. E. K. Dunham, and was found to contain a pure culture of *staphylococcus pyogenes aureus*.

### EMPHYSEMATOUS GANGRENE CAUSED BY THE BACILLUS AËROGENES CAPSULATUS.

DR. GEORGE EMERSON BREWER presented a woman, aged thirty-two years, who was admitted to the Roosevelt Hospital, on the evening of October 26, with the history that one week before she had experienced a throbbing pain in the ischiorectal region, which gradually became more intense, and was treated by the application of a flaxseed poultice. The pain increased in severity, became throbbing in character, and was accompanied by an induration and an exquisitely tender area on the right half of the ischiorectal space. She did not think that she had fever during this period; but chilly sensations, loss of appetite, and general illness would indicate that there was some elevation of temperature. There was no nausea, vomiting, constipation, nor difficulty in urination.

On admission her temperature was 101.8° F.; pulse, 120; respirations, 28. On examination, the left half of the vulva was enormously swollen, red, and exquisitely tender. The swelling extended downward, and occupied the entire right half of the ischiorectal space, and upward to the region of the external abdominal ring. In the centre of the labium there was an area of superficial gangrene about the size of a silver quarter. On palpation by the House Officer who admitted her, there was a sensation imparted to the hand of an easily reducing hernia. At the same time the tissues were ruptured and a large amount of brownish, foul-smelling fluid was evacuated from the cavity within the labium. Believing that he had to do with a strangulated inguinal hernia, a part of which had been returned to the abdominal

cavity by his manipulations, I was at once asked to see the patient with a view to operation.

On further palpation of the abdomen, there was a well-marked rigidity of the lower half of the right rectus muscle and an indefinite sense of resistance in the right iliac region, strongly suggesting either an appendicular abscess or an inflamed mass of intestine or omentum which had been reduced or sloughed off from the supposed strangulated inguinal hernia. She was immediately prepared for operation, and, under chloroform anæsthesia, an incision was made along the outer half of the right rectus muscle. As soon as the skin and subcutaneous fat had been divided, the deeper layer of areolar tissue, the external oblique aponeurosis, and the connective tissue between it and the internal oblique muscle were found to be in a state of emphysematous gangrene. Pressure on the adjacent tissues resulted in the discharge from the wound of a large amount of gas, foul-smelling fluid, and necrotic tissue.

The incision was extended upward to the free border of the ribs and downward along the inguinal canal, through the tissues of the labium and ischiorectal fossa to the coccyx. The skin and subcutaneous tissue on either side of the incision were dissected up as far as the gangrenous process extended, which was practically to the median line of the abdomen in front, and to the border of the sacrolumbalis muscle behind. Other incisions were made posteriorly, extending from the crest of the ilium upward to the level of the breast. A large amount of foul-smelling necrotic tissue was hastily scraped from the wounds, which were afterwards generously scrubbed with peroxide of hydrogen and a 2 per cent. solution of formalin. The wound was packed with wet formalin gauze and the patient placed in bed. Considerable reaction followed the operation, and for several days she presented the appearance of severe illness. The temperature, however, gradually fell to 99° F. For three or four weeks it varied between this point and 101°, the pulse between 112 and 120. The wound was frequently dressed, thoroughly irrigated, and packed with various antiseptic and stimulating agents. For many weeks the discharge was excessively foul, and large areas, including all of the anterior portion of the external oblique muscle, came away. After the wound had sufficiently healed and presented healthy granulations, three or four secondary sutures were taken, which



materially hastened her convalescence. At the end of nine weeks only a small granulating area remained.

Cultures taken from the fluid and necrotic tissues removed at the time of operation showed a pure growth of the bacillus *aërogenes capsulatus*, which was also verified by animal inoculation made at the Pathological Laboratory of the College of Physicians and Surgeons.

DR. BERN B. GALLAUDET said the prognosis of cases of emphysematous gangrene is usually extremely grave. In two cases which had come under the speaker's observation, the disease was confined to the extremities. One of the cases was that of a woman who came to the hospital with an ordinary suppurative cellulitis of the forearm, which had been incised. The symptoms persisted, and several additional incisions were made as high up as the axilla. Finally, the arm was amputated at the shoulder-joint, but the patient succumbed two days later, probably to general sepsis. An examination of the characteristic thin, fetid pus in this case failed to reveal the presence of any bacilli of saprophytic origin: there were numerous streptococci, staphylococci, and so on, but no saprophytic bacilli. The tissues, however, presented the characteristic appearance of gangrenous emphysema.

In the speaker's second case the lower extremity was involved. The condition originated in the thigh as an ordinary suppurative cellulitis, and subsequently assumed a gangrenous form. Its progress upward could not be checked in spite of numerous incisions, and within forty-eight hours it was decided to amputate. To this, however, the patient would not consent, and the case resulted fatally. The discharge in this case showed a mixed infection; in addition to staphylococci and streptococci, there was quite a colony of the bacilli of malignant œdema. The origin of the infection in this case, Dr. Gallaudet said, was rather interesting, and strongly emphasized the importance of cleanliness in the use of the hypodermic needle. The man had attempted to commit suicide by gas inhalation, and in reviving him a hypodermic injection was given in the lower thigh, producing infection and fatal consequences.

Dr. Gallaudet said it was interesting to note that in Dr. Brewer's case a pure growth of the bacillus *aërogenes capsulatus* was found. Not long ago that bacillus was believed to simply produce gas. It is probable that the sharp distinction that has

been made between the saprophytic and pathogenic bacilli is not well taken, and that each class may produce effects at one time attributed solely to the other, owing to conditions of which we, as yet, know nothing.

DR. BREWER said that the cultures in his case were taken from the deeper portion of the abdominal wound, and were carefully guarded against contamination from the ischiorectal abscess below.

### ACUTE APPENDICITIS; ABSCESS OF THE LUNG; GANGRENOUS CHOLECYSTITIS.

DR. BREWER presented a man, aged fifty years, who was admitted to Roosevelt Hospital in October last. Family and previous personal history negative. Three weeks before he had experienced an attack of diarrhoea, which continued for several days. This was accompanied by abdominal pain of moderate intensity at first, afterwards it became localized in the right inguinal region and was more severe. There was no vomiting. The pain finally became paroxysmal in character, and at times so severe as to preclude the possibility of his performing his ordinary work. When admitted to the hospital his symptoms were apparently subsiding; temperature, 99.8° F.; pulse, 72. There was slight muscular rigidity over the right half of the abdomen, with tenderness more marked midway between the region of the appendix and the gall-bladder. He was kept under observation for several days with a view to performing later an interval operation. At the end of three days his temperature was 100° and pulse 80. On the evening of the third day there was a slight rise in the temperature, increased pain, slight tenderness, and an indefinite sense of resistance about the middle of the right half of the abdomen; he looked septic, and it was decided to perform at once an exploratory operation.

Under ether anaesthesia the abdomen was opened over the appendix region by an intermuscular incision. As the caecum could not be found in its normal position, but could be felt partly surrounded by an indurated mass well upward near the free border of the liver, the original incision was closed and a second one made over the region of the indurated mass. After the peritoneal cavity was opened, the adhesions were broken down, and an inflamed appendix discovered lying in a small abscess cavity behind

the cæcum. This was removed and found to be the seat of a gangrenous perforation. The abscess cavity was treated with peroxide of hydrogen, and drained posteriorly through an incision in the flank; the abdominal cavity was closed.

The following day his temperature rose to 102° F.; pulse 124: there was evidence of a well-marked local peritonitis. The wound was freely irrigated, and the lower anterior wound opened and through-and-through drainage employed. His condition gradually improved, but his temperature never fell below 100°.

Thirteen days after the operation there was a sharp rise in temperature to 105° F., and well-marked evidences of a pneumonia of the lower right lobe detected. As the abdominal wounds seemed to be in satisfactory condition, he was transferred to the medical side of the hospital. For three weeks he remained in much the same condition, the pneumonia apparently limited to the lower and middle lobes of the right lung, although his temperature and pulse and general symptoms indicated a graver degree of sepsis than the presence only of an unresolved pneumonia would warrant.

At the end of three weeks from the first appearance of the pneumonia his condition was so grave that a diagnosis of empyema was made, and he was readmitted to the surgical service. His temperature at this time was 105° F.; pulse, 144; respirations, 40. He had profuse sweats, chills, and other evidences of grave sepsis. An aspirating-needle was introduced in several locations from behind without reaching pus; it was then introduced from the anterior region of the chest and a pocket of pus reached, apparently situated about the centre of the middle lobe of the lung. As his condition was now extremely critical, he was taken to the operating room and given a few whiffs of chloroform, and about three inches of the sixth rib quickly resected. As the parietal and visceral layers of the pleura were firmly adherent, an incision was made directly into the lung tissue. At the depth of about two inches a large pocket of pus was found and evacuated. The wound was washed with peroxide of hydrogen, and, although considerable hæmorrhage was present, a double drainage tube was introduced and the rest of the cavity packed with gauze.

Following this operation there was a gradual improvement in his condition, and in twelve days his temperature had fallen to normal, and only a small sinus, leading to the cavity in the lung,

remained. As the abdominal wounds were now healed, it was thought that convalescence was thoroughly established. For two weeks he continued to do well; temperature, pulse, and respirations were practically normal, appetite keen, gaining rapidly in flesh and strength. After being up and about the ward for several days, on the day of his expected discharge from the hospital his temperature suddenly rose to  $105^{\circ}$  F.; pulse, 130. With this there was acute abdominal pain, with muscular rigidity, and a rapidly increasing distention. The tenderness was general at first, but gradually became localized in the epigastric region. The following day there was slight improvement, and, as there had been no vomiting, a delay of a few hours was thought advisable until his symptoms suggested a more definite lesion. The original abdominal wounds were reopened, but nothing found to account for his symptoms.

The following day, as there was no improvement, and as there was a marked tenderness over the gall-bladder and right half of the abdomen, an incision was made over the outer border of the right rectus muscle, extending from the ribs to a point opposite the umbilicus. When the peritoneal cavity was opened a large amount of free, turbid fluid escaped; there was an enormous mass of adhesions, consisting of liver, omentum, hepatic flexure of the colon, and duodenum. This was carefully explored, and at a depth of two inches the gall-bladder was found greatly distended and gangrenous. This was opened and about half a pint of foul-smelling pus evacuated. A second incision was made in the flank and a large collection of pus found lying to the outer side of the ascending colon. The cavities were irrigated with peroxide of hydrogen and salt solution. A large drainage tube was introduced into the gall-bladder, an enormous drain of gauze into the upper part of the abdominal cavity, which led outward through both incisions. He was extremely ill for several days; after free catharsis, there was a gradual improvement. At the end of a week the muscular rigidity and abdominal distention had subsided, and at the end of two weeks his temperature had fallen to normal, and both wounds were granulating nicely.

It may be added that at the first dressing gentle traction upon the drainage tube resulted in its removal, together with the entire sloughing gall-bladder. The biliary fistula remained open for about three weeks; one week later all wounds were closed, and he was discharged from the hospital.

DR. F. LANGE said that in cases of appendicitis where the exudate can be felt above a line corresponding to the anterior spine of the ilium he has adopted the plan of making a posterior incision, no matter whether the exudate is in the vicinity of the anterior wall of the stomach or not. In a large percentage of such cases one will find that the exudate comes from an appendix which is located on the outer aspect of the ascending colon. Such an incision may obviate the necessity of opening the free peritoneal cavity.

## PLASTIC OPERATION FOR THE RESTORATION OF THE NOSE, CHEEK, AND SOFT PALATE.

DR. J. A. BLAKE presented a woman, aged forty-six years. At the age of eleven years a papule had appeared on the right side of the nose, which soon ulcerated. The ulcerative process destroyed a portion of the right half of nose and extended to the bones, pieces of which came away. It also involved the cheek, the skin of which is now seen to be cicatricial. The soft palate was completely destroyed. At the age of fourteen the process began to heal after taking a proprietary scrofula remedy. Nothing to remedy the resulting deformity has been done.

At the time of her admission to the Roosevelt Hospital, November 21, 1900, the following conditions were found: The right cheek consisted of cicatricial tissue. The ala of the nose on the right side had lost its attachment to the tip and was turned upward and attached to the soft parts covering the lower part of the right nasal bone. There was an aperture above the ala and between it and the cheek leading through the wall of the nose into the nasal fossa. Below the ala the nasal wall was deficient. The tip of the nose was drawn over to the right and depressed by contraction of the scar tissue and loss of the septal cartilage. The right nasal fossa was nearly occluded by adhesions between the lateral wall and the septum. There was an aperture through the latter, and a spur on its left side was adherent to the left lower turbinal. The soft palate was deficient. The operative treatment was done in two stages, the first operation being done on December 5, 1900, and consisted in clearing the nasal fossæ on both sides, elevating the soft parts from the bones on the right side, and bringing the ala down into place by suturing it to the tip of the nose. This procedure apparently increased the defect in

the side of the nose, and on healing there was a tendency to recontraction, largely by healing of the soft parts of the nasal wall to the septum, from which they had been separated. She was able, however, to breathe freely through the nose, which was impossible before.

The second operation consisted in reseparating the soft parts, freshening the margins of the defect, and turning up from the cheek a flap to fill the defects. This was done by the method of Elliot, also employed by Von Hacker. It consists of turning up a sufficiently large flap from the cheek and applying it to the defect so that the skin surface is directed to the interior of the nose, and then grafting its outer raw surface and the defect in the cheek, if necessary, by the Thiersch method.

In this case the flap was made considerably larger than the defect, so as to crowd the ala down and the bridge over, while the skin being applied to the denuded portion of the septum prevented union and subsequent depression. The grafts took very well considering the flap consisted of cicatricial tissue, only an area about one-quarter of an inch in diameter being left to heal by granulation.

The result so far has been very satisfactory; the patient has been told that later on, if she wishes it, the bridge can be raised by an artificial support.

## BILATERAL GROWTH OF THE GUMS.

DR. BLAKE presented a man of twenty-nine years, in whose mouth were to be seen two plate-like growths springing from the palatal aspect of the gums, and growing inward and backward beneath the hard and soft palate so as to resemble on casual examination a cleft palate.

The process is not confined to the gum, on their inner aspects, but also involves their buccal aspects and the gums or alveolar processes of the mandible as well.

The teeth are somewhat buried, especially the molars. The growth is very hard, but has a certain amount of elasticity suggesting fibrous tissue.

There is no venereal history and no history of local irritation, except that he has been afflicted for several years with gumboils. There is no pyorrhœa. The plate-like growths have been growing

slowly for two years, and the enlargement of the gums of the mandible has been present for about seven months.

DR. ELLSWORTH ELIOT, JR., said that last year he saw a woman, thirty-five years old; with a growth in the mouth somewhat similar to that in the case shown by Dr. Blake. It was situated in the middle line of the hard palate, and had been there for a number of years without causing the patient any pain or giving rise to inflammatory symptoms. The patient's attention was finally directed to it by the difficulty in mastication which it gave rise to, and subsequently by difficulty in talking. It was excised under an anæsthetic, and the microscope showed that it was an ordinary osteoma. Its excision was followed by a superficial necrosis of the underlying bone. This subsided about six or seven months ago, and since then there have been no evidences of a recurrence.

In Dr. Blake's case, the speaker said, the neoplasm was possibly due to some abnormal condition of the teeth which had given rise to a chronic inflammation.

DR. JOHN B. WALKER said he saw a somewhat similar case about a year ago. There was a growth of the gum about half the size of a walnut, which did not give rise to any trouble until the patient made an attempt to wear an artificial plate. The growth was then excised without any difficulty. There was no recurrence.

## RENAL CALCULI.

DR. F. LANGE showed a vial containing about a hundred renal calculi of varying size which had been passed spontaneously by an old man in the course of several years. In addition to those shown, many others had been passed which had not been preserved. The passage of these stones gave rise to frequent attacks of renal colic. The man also had diabetes, and finally died in a fit of diabetic coma. During the last two years of his life he had not complained of any renal symptoms.

Dr. Lange also showed a number of renal calculi which he had removed from the kidney of a woman who had been under his observation for over ten years. In the early course of her disease, she complained chiefly of pain in the region of the appendix. Subsequently, hæmaturia set in, and upon catheterizing the ureters the blood was found to come from the right kid-

ney. The kidney was opened, and one large and a number of smaller stones removed. The large calculus was found to be made up of a number of smaller calculi which had coalesced. Three or four months after the operation the patient had a severe attack of renal colic and passed a fairly good-sized calculus through the urethra. The speaker said he was rather surprised at this, as he had been fairly certain at the time of operating that the kidney contained no more stones. He suggested that in cases where stones are distributed in the kidney substance and calices, it would be a good plan to draw out the organ and cut it along its convex surface,—the autopsy cut. This would permit of a very thorough search. In those cases where the kidney is fixed by adhesions, we must be content to do the best we can from the pelvis of the organ.

Dr. Lange also showed a pyonephrotic kidney which he had removed from a woman who had been under his observation for twelve years. She first passed a small stone, and presented an enlarged and somewhat painful kidney on the right side. Repeated cystoscopic examinations showed clear pus coming from the corresponding ureter. The kidney was removed with much difficulty, owing to its brittleness. It had to be taken out piecemeal. The patient is making an uneventful recovery, and the remaining kidney is acting favorably.

Dr. Lange also showed another kidney which he removed about two months ago. It was probably tuberculous. The pelvis was much enlarged and contained a large quantity of pus. A bougie was inserted through the ureter to the bladder without detecting any obstruction. On account of the patient's condition at the time of operating, it was deemed inadvisable to remove the ureter: it may eventually have to be removed, as a fistula still remains leading down to it.



# TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

*Stated Meeting, November 5, 1900.*

The President, DE FOREST WILLARD, M.D., in the Chair.

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## INFECTION BY THE BACILLUS AËROGENES CAPSULATUS IN AN OPEN FRACTURE OF THE RADIUS AND ULNA.

DR. JOHN B. ROBERTS said that he desired to put on record a case of gangrene of the forearm after an open fracture, which appears to have been due to infection with the gas bacillus.

A young girl, aged twelve years, slipped and fell on August 31, 1900, sustaining a fracture of the left radius and ulna about the junction of the middle and lower thirds. One of the fragments of the ulna made a small wound through the skin. Dr. J. H. Hardcastle, who had charge of the case, cleansed the wound with soap and water and solution of corrosive chloride of mercury (1 to 1000), and dressed it with iodoform gauze and cotton. He says that there was a little dirt over the site of the wound when he first saw the patient, and that the bone did not protrude through the small opening, though he believed that the tear in the skin, which was perhaps a third of an inch long, was caused by the projection of the bone against the soft parts at the time of the injury.

When first seen by Dr. Roberts, on Friday, August 31, three days after the accident, the left hand was bluish black or slate color, and cold. A small wound of the skin existed on the palmar surface of the wrist over the lower part of the shaft of the ulna, perhaps one inch above the joint. It was a small puncture, and not gaping. The skin around this opening was blue and darker than the rest of the skin of the wrist or hand. The discoloration extended up nearly to the elbow, farther posteriorly than an-

teriorly. The arm was swollen and tense and crepitated on pressure. The arm above the elbow was swollen but not dark. The patient was etherized, and several long incisions were made from elbow to hand, through the skin and deep fascia, exposing bluish gangrenous muscles at places. Bleeding occurred from the upper part of the incisions, but not from the gangrenous areas in hand and forearm. The wound was dressed with wet mercuric chloride dressing. The patient had a temperature of  $103.8^{\circ}$  F., and albumen with casts in urine. She was clear-headed and did not complain of very much pain.

The next day he amputated about the middle of the upper arm, making first a circular incision about two inches below the elbow, hoping to save the joint and part of the forearm. This showed the disease in the deep muscles to extend higher than in the overlying skin. The tissues over the olecranon were blue, while in front the disease was not so high up. Finally, an irregular amputation was made by anteroposterior flaps above all gangrenous structures. The tissues left were, however, slightly crepitant. There was not much fluid in the tissues. He dissected the specimen along the radial and ulnar arteries near the injury, but found no rupture or laceration of vessels. The arteries seemed to have clot in them and were discolored. There was not much fluid and not a great deal of gas in the tissues. There was some gas, however, and a few blebs had shown themselves on the hand. The most active focus of death was near the small puncture, which suggested that infection had been caused by a gangrene-producing germ. Both bones were broken at the line of wound.

Two days after the operation urticaria was noticed upon the limbs and trunk. About half an inch of one of the flaps showed gangrene. An examination of the axilla showed no enlargement of the lymphatic nodes. The stitches were removed and the lips of the wound allowed to gap; and the arm was again dressed with solution of corrosive chloride of mercury, which had been used since the time of operation.

On the next day the patient spat about half a drachm of blood, which she thought came from her nose; but the temperature had fallen to about  $100^{\circ}$  F. The wound was the seat of a very offensive odor, and the gangrenous process in the flap had extended slightly. The dressing was changed to a solution of

1 per cent. formaldehyde. The urine still contained albumen. From this time the patient's condition rapidly improved. The foul odor was destroyed by the formaldehyde, the gangrenous process ceased, and the dead tissues became mummified. The albumen and granular casts disappeared from the urine, and the child was discharged from the hospital on the twentieth day after amputation, with, however, the wound not entirely healed.

The rapidity of the gangrenous process, the fact that the attending physician stated that the splint and dressings had not been applied unduly tight, the evident activity of the morbid condition around the site of the wound, and the crepitant condition of the limb above the seat of gangrene suggested that the unfortunate result of the fracture was due to infection with some gangrene-producing micro-organism. An examination of the amputated arm at the Pepper Laboratory was made by Dr. S. S. Kneass, who found the *bacillus aërogenes capsulatus* in the tissues. Dr. Hardcastle had recently informed the operator that at the time he dressed the wound and fracture, he was assisted by a girl who had been nursing a case of what was supposed to be erysipelas, the result of a wound of the arm from a meat-hook. Dr. Hardcastle did not know this at the time he accepted her as an assistant.

DR. M. B. MILLER said that, as far as he had been able to learn, this was the first case of infection by the *bacillus aërogenes capsulatus* recorded in Philadelphia or its vicinity. All the work on this bacillus in this country had been done in the neighborhood of the Johns Hopkins Hospital.

He had seen the patient with Dr. Roberts. There were two features about it which particularly impressed him,—one was the curious feeling of the gangrenous arm. The only thing that he could compare it to was the crepitant feeling of pulmonary tissue. The other feature that impressed him was that this gas formation was not only in the tissues themselves, but also involved the blood-vessels. Both in the radial and ulnar arteries the gas had formed in the form of long bubbles, with smaller areas of blood-clots in between, giving a beaded appearance that could be seen through the blood-vessel walls.

DR. HENRY R. WHARTON said that he noticed in Dr. Roberts's case a similarity between the clinical symptoms presented and those of traumatic spreading gangrene that surgeons used to see formerly, but which is rarely seen at the present time. Certainly

there were a great many symptoms in common with the infection produced by the *bacillus aërogenes capsulatus* and the infection that was present in cases of spreading gangrene—traumatic spreading gangrene—which was often seen in compound fractures, the form of gangrene described by the French writers as “bronzed gangrene.” He had never seen cases in which the presence of the *bacillus aërogenes capsulatus* was demonstrated, and yet, from the description of these cases, there is a similarity to the cases of spreading gangrene. He remembered a compound fracture of the forearm in which this form of gangrene developed in twenty-four hours and spread rapidly from the forearm up to the shoulder. In this case, by prompt amputation at the shoulder-joint, the patient’s life was saved. He formerly saw a good many cases of spreading gangrene, not only in his own hospital experience, but in that of Professor Ashhurst, in which prompt amputation saved many lives.

DR. J. B. ROBERTS rejoined that Dr. Miller had just reminded him that Dr. Kneass reported to him that he found a pure culture of the *bacillus aërogenes capsulatus*. It was not a mixed infection. He had seen spreading traumatic gangrene where there was a great devitalization of cells from the injury itself; and he had seen cases of spreading gangrene, not after such crushing injuries; but he did not recollect ever having seen gangrene spread with such great rapidity as here, unless there was something in the extent of the injury or in the damage to the vessels to cause it. There was here a little wound, an insignificant thing, yet in three days the girl’s arm was gangrenous irregularly up to the elbow; the temperature was  $103.8^{\circ}$  F.; and albumen and tube-casts were present in the urine. He believed that what used to be called hospital gangrene would, under the present bacteriological methods, be found to be an infection of this bacillus, the bacillus of malignant œdema, or some similar organism. The so-called bronze gangrene he was not familiar with. He had never seen angina Ludovici, which is probably an infection with the bacillus of malignant œdema. Many of the old descriptive names for various forms of gangrene have fallen into disuse, because bacteriological investigation has enabled surgeons to discard them for more accurate designations founded on the bacterial character of the infections.

## LEFT-SIDED APPENDICEAL ABSCESS.

DR. FRANCIS T. STEWART reported the case of a boy, aged nine and a half years, who entered the Pennsylvania Hospital, August 8, 1899, suffering with diarrhœa and slight fever. There was nothing in the family or previous history bearing on the case. Four days before, after eating candy and pop-corn, he began to vomit, and complained of abdominal uneasiness. The bowels readily responded to a laxative, the loose movements persisting. On admission the abdomen was slightly distended and the lower right quadrant tender. The walls, however, were flaccid, and no mass could be felt externally or by rectum. He was sent to the medical ward with a diagnosis of enteritis. At the end of two weeks the tenderness had disappeared, the abdomen had become flat, and some induration could be palpated between the umbilicus and the left anterior superior iliac spine. On the nineteenth day, the mass having increased considerably in size, an incision through the abdominal wall was made by Dr. Le Conte, and a large quantity of foul pus evacuated. The abscess cavity was trabeculated and completely shut off from the general peritoneal cavity by firm lymph. The appendix was not found, nor was it diligently searched for. Six weeks later the wound had practically closed.

Dr. Stewart said that this case might be regarded as one of enteritis, followed by appendicitis travelling from the base outward to the tip, which lay to the left of the mesial line; the supuration being caused by a migration of the bacteria rather than by a perforation, as there was neither gas nor fecal concretion in the abscess cavity. The pus was thought to be appendiceal from its character; but that the infection originated primarily on the right side is probable, because of the situation of the initial tenderness, as there was no transposition of the viscera, and because of the rarity of left-sided appendicitis. Edebohls (*New York Medical Record*, November 25, 1899), who has made a very exhaustive study of the literature of appendicitis, says, "As regards left-sided appendicitis, the only genuine case thereof on record is that of Biegi (*Med. Moderne*, 1897, viii, p. 643), which occurred in a soldier who died of appendicitis, and was found on autopsy to have a complete transposition of all the viscera. The case of Bontecou (*Transactions of the Medical Society of New York*, Albany, 1873, lxvii, pp. 137-139), in which death resulted

from ulcerative perforation of the small intestine into the left iliac fossa; that of Traube (*Medical News*, 1893, lxiii, p. 604), of a perityphlitic abscess pointing on the left side; and the three cases reported by Fowler, in which the cæcum and appendix were displaced to the left, all originated primarily in the right iliac fossa. So did the case of Coates ("Manual of Pathology," 1895), in which empyema of the left chest followed perforation of the diaphragm from an abscess of appendicular origin."

#### APPENDICITIS COMPLICATED WITH LEFT-SIDED ABDOMINAL ABSCESS AND LEFT PYOTHORAX.

DR. STEWART reported a second case, for which his thanks were due to Dr. Morton for the privilege of operating upon and reporting. A man, aged nineteen years, was admitted to the Pennsylvania Hospital, November 7, 1899, after having suffered five days with abdominal pain. There had been no chill, vomiting, or constipation. Nothing relevant in either the family or previous history could be ascertained, except that he had been struck a smart blow over the appendix several days before the onset of pain. He had had the opportunity to observe several patients who attributed their appendiceal trouble to injury. Small (*Medical Record*, September 10, 1898) reports thirteen cases of appendicitis with a clear history of trauma. The temperature was 100° F.; respirations, 28, and pulse, 100. Both recti were hard, the pain active, and tenderness most marked at McBurney's point. No mass could be felt and no dulness elicited, although, as was afterwards ascertained, the appendix lay just beneath the abdominal wall. An incision in the right semilunar line was immediately made, opening a large abscess which was completely isolated from the surrounding peritoneal cavity. The appendix measured three inches, pointed directly inward, the tip adhering to the parietal peritoneum just to the left of the midline, and the outer two-thirds was gangrenous. During enucleation the distal extremity was ruptured. There was no foreign body and no faecal concretion. The abscess cavity was loosely filled with gauze. On the third day the temperature reached 101 $\frac{1}{5}$ °, and thereafter varied between 99° and 102° until the second abscess was opened. On the ninth day he had a chill, the discharge which had been profuse became scanty, and a mass was detected in the lower left abdomen;

this was opened on the twelfth day, evacuating several ounces of foul pus. The patient was comfortable and the temperature normal for twenty-four hours, when, after feeling chilly, the temperature arose to  $103^{\circ}$ . As the discharge from the abdominal wounds decreased, the symptoms of sepsis increased. On the twentieth day there was another chill, followed by a temperature of  $104^{\circ}$ , and this by a profuse sweat. On the twenty-first he suddenly expectorated a large quantity of foul pus containing the bacillus coli communis, severe axillary pain followed, and at the end of twenty-four hours the expectoration had ceased, the left chest had become flat, and the heart had moved to the right. The pleural cavity was opened through the seventh interspace and a rubber tube inserted. From the foul brown liquid which escaped cultures of the colon bacillus were obtained. The temperature fell to normal and recovery seemed assured, when on the thirty-first day he began to complain of increasing abdominal pain. He became constipated, peristalsis could be seen above the wounds, and fever again appeared. It was feared that adhesions obstructed the fæcal current and that a fourth operation would become imperative, but the bowels were finally induced to move, and on the thirty-fifth day, four days after the onset of abdominal pain, he was again comfortable. He was discharged on the thirty-eighth day, with a small tube still in his chest and both abdominal wounds closed. Since leaving the hospital there have been several attacks of pain, with transient constipation.

A pronounced feature of this case was the rapidity of abscess formation and the remarkable recuperative power, both general and local, which was exhibited. The primary abscess promptly closed when the second was opened, which in turn rapidly healed when the pus migrated to the thorax; the pulmonary abscess discharged through the mouth only twenty-four hours, and sixteen days after the empyema was drained the patient was able to go home. And this, with the absence of joint, liver, and endocardial inflammation, would seem to indicate that the suppurative process extended by contiguity rather than by the blood channels, as in pyæmia. There were no symptoms of diaphragmatitis, and the abdominal abscess apparently did not extend as high as the abdominal dome.

In Edebohl's (*Ibidem*) article there are recorded nine cases of appendicitis with lung complications,—four of these were em-

pyemas, three perforation of the lung by abscess, one gangrene of the lung, and one pneumonia. Weber (*Deutsche Zeitschrift für Chirurgie*, February, 1900) reports nine cases of subphrenic abscess; in six of these right-sided pyothorax developed, and in one of these perforation of the diaphragm was found. Jeanmire (*Gazette Hebdomadaire de Médecine et de Chirurgie*, March 1, 1900) puts on record a case of appendiceal abscess opening into a bronchus and followed by recovery.

DR. JOHN B. DEEVER said that he thought the report of these two cases to be very strong arguments in favor of early interference and against delay in operating upon appendicitis. He had seen cases similar to those described by Dr. Stewart time and time again. They are always late cases. This left-sided condition of the appendix is not an uncommon condition. He took the credit of first calling the attention of the profession to pain in the left side as indicative of a southerly position of the appendix. In these cases he always took the appendix out and had never made an incision on the left side of the abdomen. He did not think for one moment that this was originally a case of enteritis. It was appendicitis from the start.

In operating, he incised over the seat of the appendix, that is the normal position of the appendix, and worked his way down into the pelvis and removed the appendix, drained, etc. Although it is the practice of some physicians to tap them through the rectum, and, in a few cases in the female, through the vagina, this practice he highly disapproved of. These cases demonstrate the ravages of appendiceal pus. He had seen pus make inroads in cases where the physician in attendance did not recognize the condition. He had seen a number of cases where appendiceal abscesses had ruptured into the lungs, and by way of the bronchus escaped through the mouth. These are not very uncommon conditions in late cases. There is very much that can be said on the subject, but nothing against early interference, interference at the earliest possible moment.

## FRACTURE OF THE FEMUR IN AN INFANT.

DR. H. AUGUSTUS WILSON reported the case of a well-nourished infant of three months, who was brought to him with a marked fulness in the upper and inner part of the left thigh, which was palpably due to a bony mass just below the great trochanter.



Examination showed the enlargement of the thigh to be probably due to a mass of callus and malposition following a fracture, the fragments having united at an obtuse angle, the apex pointing forward. There was no demonstrable shortening, and it was inferred that no overlapping had taken place.

He availed himself of the presence in Philadelphia of Dr. H. M. Sherman, of San Francisco, who operated upon the patient on May 5, 1900, at the Philadelphia Hospital. Incision of the soft parts overlying the mass showed that the swelling was due chiefly to a very large mass of callus, and that there had been a fracture just below the great trochanter, and union had taken place, as surmised, with angular deformity, which was far less than external appearances indicated.

The exuberant callus was chiselled away, the fracture reproduced, and the fragments put in apposition in proper position. It was found impossible to make the delicate bone hold a silver-wire suture, and therefore maintenance of apposition was secured by splint. The wound was closed with catgut suture, a small sterile gauze drain being tucked into its middle, which was removed the next day without removing the outer gauze dressings.

The plaster-of-Paris splint included both legs and extended up to the chest, being in effect a double spica of the thighs and hips. The legs were moderately abducted and a light stick, reaching across from one foot to the other, was included in the bandage, and thereby increased stability.

During the application of this apparatus, Dr. Sherman devoted his especial attention to the position of the affected leg, to secure the best possible position of the fragments. Recovery was uninterrupted, and at the expiration of four weeks the original dressings were finally removed, and the result found to be perfect.

Dr. Wilson said that the question of causation of this fracture was of moment from the medico-legal stand-point, as the obstetric procedures at the child's birth were unusual. The delivery was accomplished by Dr. Edward P. Davis, who would state the difficulties encountered.

In the opinion of Dr. Sherman the history was one of a plain procedure with no serious complications. The only force applied to or transmitted through the femur was simple traction, slight leverage was used, or could have been used. Furthermore, the whole of the traction force did not act on the femur, for the mus-

cles between the tibia and the pelvis, both on the front and back of the thigh, must have taken some of it. It may be that, rarely, this procedure could cause a dislocation of the hip; but it is very unlikely, hip dislocations being much more easily accomplished if the thigh is flexed on the abdomen and then force applied to the knee, pushing the femoral head over the lower and hinder part of the rim of the acetabulum where it is low.

The clinical history after delivery showed no immediate disability, but one that developed a few days after birth. The inference is unavoidable that the fracture was either intrauterine or occurred after delivery. As no history of fall can be obtained, it would appear that the fracture was intrauterine, with slight manifestations which made it possible to overlook its existence at the casual examination made by Dr. Davis's instructions immediately after delivery.

Dr. Sherman had further called attention to the fact that obstetricians endeavor, in getting hold of the child's limbs in utero in order to move them, to seize them near a joint. Naturally, the hip-joint would be the one most accessible, and the femur the bone most frequently grasped. If a finger is slipped into the groin and traction made to extend the thigh, and so pull down the leg, the work is done at a disadvantage, for the weight, the leg, and foot are on the long arm of the lever, that is, the distance between the finger and the knee.

Kustner (*Handbuch der Geburtshülfe Mueller*, iii, p. 311) says that if the finger or a hook slips upon the femur in doing this, the bone will break at its upper third, as that is its thinnest part, and that the fracture occurs at that part, if the force is used near it.

A case was reported from Professor Rubeska's Clinic in 1893 in which the femur broke at this place in a spontaneous delivery. In *Archiv für Gynäkologie*, Band xxx, p. 264, is reported a case with many fractures, both femora at the middle among them. Still, it would seem to be right to get the finger slipped along the front of the thigh to the knee as soon as possible to get the force near to the weight and shorten that arm of the lever. He was permitted to report also two cases seen by Dr. H. M. Sherman, as follows:

CASE I.—June 23, 1894. An eleven weeks' old girl baby,

normal apart from a deformity which consisted in a shortened condition of the left thigh, all the tissues being affected, the shortening being 4.5 centimetres. The history was of an easy non-instrumental birth, after a healthy and comfortable pregnancy. The mother was twenty-three years old, and this was her first child. The shortened condition existed at birth, but the child kicked the leg normally. During the last few days the child has held the leg flexed, and has cried if it was moved or handled.

Examination shows a depression or dimple in the skin on the outer side of the thigh at its middle. The knee and the leg and foot are normal, and of the same size as those of the other side. It is not possible to make out the femur through the soft tissues above the middle of the thigh. A false point of motion can be made out at about this point, and at times crepitus can be felt. There has evidently been an intrauterine fracture and much overlapping, and this must have occurred so early in intrauterine life as to have permitted the soft tissues to fit themselves to the shortened bone. Union probably took place with this overlapping, and a refracture has occurred within the past few days. There is nothing in the history of the mother's pregnancy that can explain the occurrence of the fracture.

July 30, 1894. This baby was put in a portable apparatus which permitted vertical traction to be made on the limb, and this was removed a few days ago. The child now kicks the leg about as she does its fellow. It is still impossible to palpate the upper part of the femur or the trochanter through the soft tissues.

August 14, 1894. To-day the presence and position of the trochanter can be made out. The limb is, roughly, 6.25 centimetres shorter than its mate.

December 12, 1894. To-day, through the dimple or cicatrix on the outer side of the thigh, the lower end of the upper fragment of the thigh can be felt. The shortening is the same.

July 15, 1896. The shortening is now eight centimetres, and is all in the femur. With a lift under the shoe, to compensate the shortening, the function of the limb is perfect.

August 16, 1897. The shortening is now nine centimetres. Child healthy and active.

August 28, 1898. The shortening is now 10.5 centimetres, and all in the femur.

September, 1900. This child has been found and has been

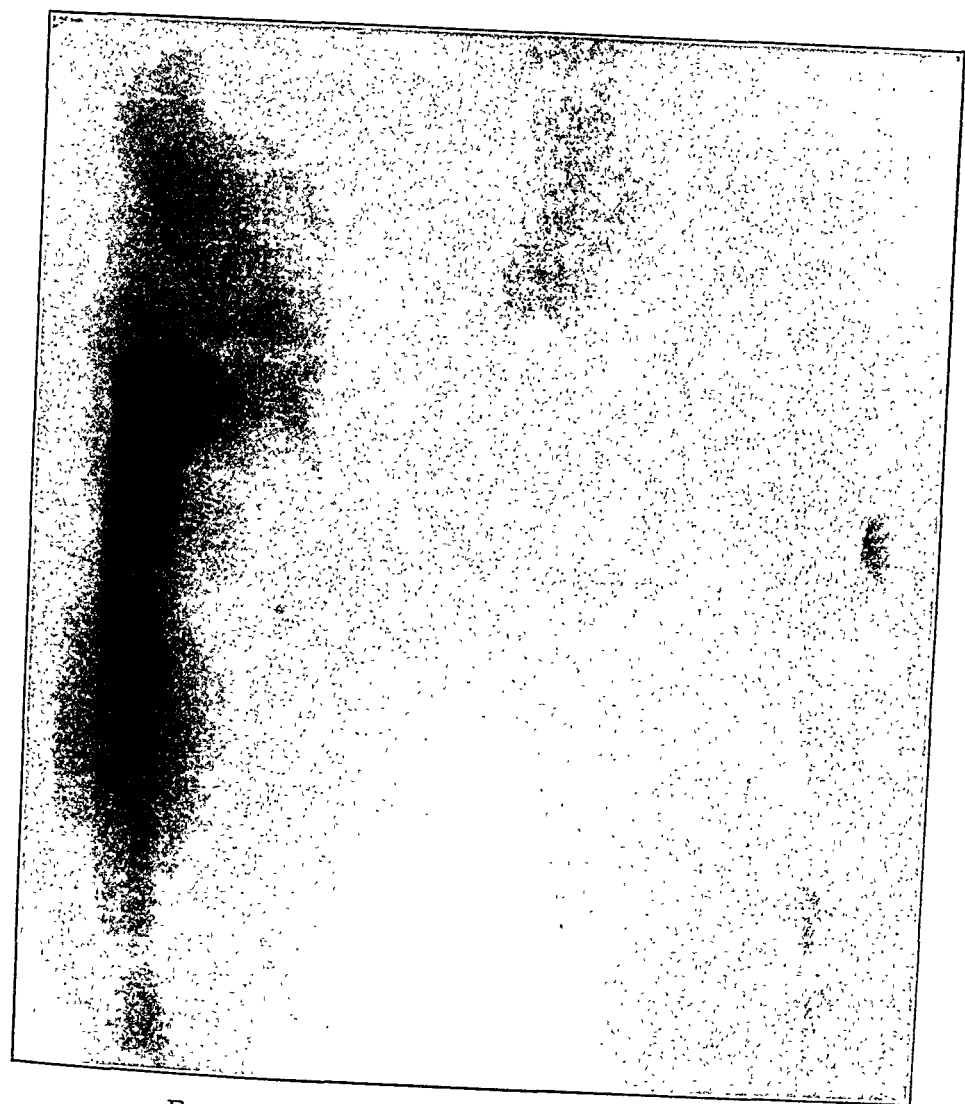


FIG. 1.—Congenital deficiency of the left femur.





FIG 2—Shows delayed ossification at the lower epiphysis and entire absence of the upper epiphysis of the femur



radiographed, and the result is very confusing. There is a plain coxa vara, with the appearance of the femoral neck having been fractured rather than bent down. This was probably the site of the fracture that was diagnosed, but incorrectly located, in June, 1894. There is no evidence of there ever having been any injury to the shaft of the femur, and the apparent discovery of the lower end of the upper fragment, in December, 1894, was a mistake, which is not now possible of explanation. The limb is still shorter, and the location of the fracture may explain the constant increase in the shortening by a possible injury of the epiphysis and interference with growth, both directly at the epiphysis and, by reflex action, through the whole femur.

The thigh is now, September, 1900, twelve centimetres the shorter, that is, the shortening has increased 7.5 centimetres since birth. The leg is of the same length as its fellow. The function of the joint and limb is perfect, and with a high patten, to compensate the shortening, the child gets about as well as other children.

If this case was one of fracture of the femoral neck in a newborn baby, the case must be a unique one.

CASE II.—September 11, 1899. The child, a seven months' old baby, was born with the left thigh much shorter than the right. The skin and other tissues fit the short leg, *i.e.*, the tissues of the limb are shortened. No history of injury to the mother during pregnancy. No injury to child during delivery.

There is an angular deformity of the shaft of the femur, due to union in a faulty position after, possibly, intrauterine fracture of the femur. Child otherwise apparently normal.

The radiograph shows delayed ossification at the lower epiphysis and the entire absence of the upper epiphysis of the femur. Ossification in the shaft ends a little above the middle, and at the middle is a curve or knuckling of the bones or a faulty position after a fracture.

The prospect of benefiting the boy is slight; treatment is withheld, at any rate, for three months.

DR. EDWARD P. DAVIS said that the case which Dr. Wilson had described was that of a rhachitic pelvis, in which labor began with the vertex presenting and the back directed to the left side of the mother. When the mother became exhausted, the forceps was applied and the head brought into the pelvic cavity, but the



effort to deliver the head was not successful. It was found that the shoulders had become impacted at the pelvic brim, the body of the child being turned transversely, and that delivery could not proceed. Accordingly, the forceps was removed and version was performed. The selection of version as a mode of delivery arose from the fact that in version one can much better control the delivery and passage of the shoulders through the pelvic brim.

In performing the version, it was found that owing to the long-continued labor, the escape of the amniotic liquid, and efforts at delivery, the child's body had become extended, the limbs being no longer flexed, but the feet and knees being in the fundus of the uterus. The legs were grasped near the knees, the grasp upon the limbs being as extensive as possible, and gentle traction was made, while the body of the child was rotated during traction in such a manner as to bring the back of the child towards the mother's abdomen. This was not a case in which the finger or an instrument was hooked into the groin, because this was not a case of breech presentation. The version was exceedingly difficult because of the long-continued labor and the fact that the child had become unfolded. Considerable force was applied upon the femora and in the actual turning of the child's body; this force must not have been that of traction only, but of rotation as well. The child was slightly asphyxiated when delivered, but was soon resuscitated.

Immediately after birth, the child was examined, but no fracture or luxation was made out at that time. About ten days afterwards, the Resident Physician reported impaired motion and pain upon handling in this infant. The child was accordingly examined a second time, but still without eliciting evidence of fracture. It seemed that very probably the sacro-iliac joint upon the affected side had been injured. The child's general development proceeded without interruption. The possibility of a greenstick fracture or of injury to the epiphyses was always considered and admitted.

In this connection, he added a report of a case of complete fracture of the humerus occurring under the following circumstances. The patient was in labor without medical attendance. During the labor, the head presenting, the hand of the child presented also. A woman who was assisting the patient, becoming frightened, made traction on the hand, and by vigorous pull-

ing ended the labor. The arm of the child was found broken at about the middle. Mother and child were brought to the Jefferson Maternity, when a complete fracture was evident. The child was dressed by utilizing the body as a splint and bandaging the arm to the trunk. It made a perfect recovery in function, length of limb, and continuity of form.

Dr. Davis further remarked that in general, from the standpoint of obstetric surgery, surgeons may be called upon to deal with fractures of the cranium, fractures of the clavicle, and of the long bones of the extremities. Omitting fractures of the cranium, excessive width of the shoulders may result in fracture of the clavicle, and in some cases it is necessary to sever this bone to perform delivery. Fracture usually occurs in difficult version or in cases of head presentation where the arm or shoulder is pulled upon vigorously to secure delivery. In performing embryotomy, if the shoulders of the child be excessively broad, obstetricians sometimes perform cleidotomy, cutting the clavicles with stout blunt-pointed scissors. This allows the shoulders to collapse, reducing the transverse diameter of the trunk.

Injuries to the shaft of the humerus occur in version where the arms become extended. In bringing down the arms, the effort is made to pass the fingers along the humerus to the elbow, thus flexing the forearm and carrying the arm towards the body of the child. In spite of this traction, cases occur in which the mother's condition is so grave that delivery must be effected at once, regardless of injury to the child. He recalled the case of a woman, thought to be dying from disease of the heart, in whom it was necessary to perform version and extract the child as rapidly as possible. The child's elbow became impacted at the brim of the pelvis, and in bringing down the arm the humerus was fractured. The child made a good recovery with the application of simple dressings. Separation of the epiphyses of the humerus may occur instead of fracture in version. Fractures of the forearm are rare. Fractures in the shaft of the femur are not common, and usually follow cases of breech presentation, in which strong traction is made with a hook upon the child's extended thighs.

Luxations of the large joints of the foetal body may occur as the result of difficult delivery. The joints of the pelvis are subjected to considerable strain in moderately contracted pelvis when

the child presents by the breech, and the descent of the breech must be brought about by traction in the groins of the foetus. A blunt hook, such as that found upon the handle of the Hodge forceps, is sometimes inserted into the groin and traction made in this manner. Whenever possible, the finger should be used in place of the hook, as injury is not so likely to occur.

So far as Dr. Wilson's case is concerned, it had been his impression that the fracture resulted during the version. It may have been but partial, as it was not detected at the time, and may have become complete when the child was bathed and dressed, and when it grew strong enough to move its limbs.

DR. W. REYNOLDS WILSON spoke of a case of supposed epiphyseal separation of the femur, with reference to the manipulative procedure which might have been responsible for the lesion. The foetus, in the oblique position, namely, with the back forward and the head in the left innominate fossa, presented by the right shoulder. The right arm was prolapsed. He anæsthetized the patient and attempted to perform podalic version. An attempt was made to grasp both knees of the foetus and bring the breech to the inlet, allowing the child to ride up out of the pelvis. In an attempt to grasp both knees, he found the greatest difficulty in rotating the child; but in making a second attempt, when he seized the upper knee only, the child was rotated without difficulty. It was still necessary for him to use great force to deliver the breech. As he extracted the breech, he felt distinctly what impressed him as a separation of the deeper structures of the anterior thigh. He afterwards dissected the child, which had been born dead, and studied the femur carefully. He found no fracture and no epiphyseal separation. Experimentally he wished to see what the bone would stand. He found that it resisted considerable force. In attempting, also, to separate the epiphysis at the head of the femur, he found that the juncture was protected by the capsular ligament which is carried down to the periosteum of the shaft proper, a condition of the parts which seems to be especially adapted to the protection of the continuity at this point. It appeared to him that the condition of ossification in utero must necessarily have much to do with the fractures and separation of parts of the bones, the seat of lesion found after delivery. In his examination of the bone of the femur, he was impressed with the spongy condition of the upper and lower portions of the shaft, also with the cartilaginous condition of the head of the bone.

DR. JOPSON remarked that since fracture of the femur at the time of birth is somewhat rare, he would report a case that he had seen two or three years ago at the Children's Hospital, in an infant three or four days old. The seat of fracture was about at the junction of the middle and upper third. There was marked tendency to flexion of the upper fragment, as in the first case reported by Dr. Wilson, in which the bone became united in that position. The child was several days old at the time of its first visit to the hospital, and the spasm of the muscles at this time was very great, probably due to the fact that the fracture had received no treatment up to that time. He treated it by applying a lateral pasteboard moulded splint, such as is often used with good results in fractures of the femur in infants; but the spasm was so great that the deformity had returned on subsequent visits. After two or three visits, the father discontinued bringing the child.

DR. WHARTON said that he had seen quite a number of cases of fracture of the femur in infants. These are usually in infants brought to the Children's Hospital, varying from a few hours to a few weeks of age. In many of these cases he could not find, in obtaining the history of the case, that the labor had been a difficult one. He was inclined to think in the majority of cases that the injury resulted from accidents after birth. In many cases the child had been allowed to fall, and in very few cases was there history of difficult or instrumental labor. In the majority of cases the injury seems to be in the upper third or near the middle of the shaft of the femur, and in such cases he usually found that there was an anterior deformity, due to flexion of the thighs, the upper fragment being drawn upward. He had been able to correct the deformity, and get satisfactory results without resorting to osteotomy. He had done osteotomy for correction of deformity following fracture of the thigh in older patients. In one case, a girl nine or ten years of age, there was a marked deformity in which a very good result followed an osteotomy. He had seen several fractures of the humerus in infants, coming under observation a few days after birth, which had apparently resulted from some manipulation during labor. He had also seen one or two cases of fracture to the clavicle following labor; but in his opinion fracture of the femur was much less common from labor than was supposed, and often fracture accredited to labor was due to some accident after labor.

DR. RODMAN said that recently he had seen a premature child at seven months, and very badly developed, who had a fracture of the right femur, with marked deformity. He had been asked to see the case with the attending physician on account of the fact that the latter feared to give an anæsthetic to such a premature and poorly developed child. He was able later to bring the limb into very good position without the aid of an anæsthetic.

DR. STEINBACH remarked that among the cases of fracture in infants which he had seen was one of fracture of the femur about the junction of the middle and upper third, with displacement of the upper fragment upward and outward. The breech had presented, and the accoucheur had experienced difficulty in extracting the child by hooking the index-finger into the groin. He saw the child on the fourth day. The fracture was a complete one. In treatment he used the inclined plane. Wire was shaped to the buttock and to the back of the thigh, which was flexed upon the abdomen, and the leg, which was flexed upon the thigh, securing these with a plaster bandage which held the fragments in firm position. The whole abdomen was surrounded by several turns of a like bandage. Within about sixteen days there was perfect union and the dressing could be dispensed with; only one dressing being necessary for the purpose. The child rested comfortably. The dressings were not soiled during defecation.

DR. WILLARD said that he had seen several cases of fracture of the femur occurring during delivery, and, although the fracture frequently was not discovered until several days after birth, yet on questioning the mother or nurse they admitted that the child had cried whenever it had been handled. It seemed to him that this late discovery of these fractures explains the statement of Dr. Wharton attributing these injuries to falls after birth. In many cases the fracture has been produced by the application of the hook in the groin; direct traction upon the femur, instead of dislocating the head or carrying off the epiphysis, has resulted in fracture. He had always dressed these injuries immediately with plaster of Paris from the thorax to the foot, making strong traction on the fragments and putting them in position at the time. In every case he had had good union without any noticeable deformity, and union has always been speedy.

DR. H. AUGUSTUS WILSON said that he believed that in a large majority of cases the so-called obstetric fractures are coin-

cidental, and not due to the obstetric procedures. He believed that they were, in the majority of cases, intrauterine, and he was drawn to that conclusion by statements made that fractures have been discovered at the time of birth, or shortly afterwards, in cases where the births have been very easy, and, in addition, by the statement of Dr. W. Reynolds Wilson in showing the tremendous power employed in podalic version in the case reported by him without injury to the bone.

He had tried his best with a number of foetal femurs to break them by some such manipulation as Dr. Davis had resorted to. He had been unable in one of them to produce a fracture above the middle third. He had been able to produce a fracture at the middle third, and it was done by a pull and a twist at the same time. But in the case reported by him the fracture had occurred just below the trochanter, where the bone is thicker at the time of birth than the middle of the shaft, and where the strain would be possibly not as great as it would be either at the hip-joint or middle third; so he felt that Dr. Davis, with the strong hand and finger that he possesses, is unable to produce a fracture by his method of procedure.

In conclusion, he directed attention to the medico-legal aspect of the subject under discussion. He believed there was more than enough evidence that this fracture did not occur at birth, but previously, due to faulty process of ossification, and that it was a coincidence that forcible delivery was instituted.

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*Stated Meeting, December 3, 1900.*

The President, DE FOREST WILLARD, M.D., in the Chair.

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## CHOLECYSTOSTOMY FOR OBSTRUCTION OF THE CYSTIC DUCT.

DR. HENRY R. WHARTON presented a woman, aged fifty-three years, who was admitted to the Presbyterian Hospital, January 23, with the history that for some years she had suffered with indigestion and intermittent attacks of jaundice, paroxysmal pain, chills and fever, which symptoms persisted, varying in

severity, up to the time of her admission to the hospital. Upon examination it was found that she was much emaciated, weighing only sixty-seven pounds, and was deeply jaundiced; the abdomen was moderately distended, and palpation showed that the liver dulness extended downward beyond the umbilicus.

The patient was etherized and an incision made, and the gall-bladder was exposed with some difficulty, as it was very much contracted, being not over three inches in length and three-fourths of an inch in diameter, and as it was overlaid by the hypertrophied liver. When it was exposed and palpated it was found to contain several stones. It was also adherent to the surrounding tissues. As it was found impossible to bring the gall-bladder up to the surface of the wound and suture it to the tissues of the abdominal wall, the intestines were carefully packed away from the bladder with sterilized gauze, which was held in place with retractors, so that a free exposure of the gall-bladder was obtained. The gall-bladder was then opened and several stones were removed, and at the upper part of the organ a large-sized stone was found, a portion of which was impacted in the cystic duct, the remaining portion protruding into the gall-bladder. This was removed with some difficulty. As it was found impossible to bring the edges of the gall-bladder up and suture them to the abdominal walls, the gauze packing was allowed to remain, and a large rubber drainage tube was introduced to the bottom of the wound, and the ends of the wound were closed with silkworm-gut sutures.

After the operation there was profuse discharge of bile from the wound, and the patient suffered from more or less persistent vomiting; the abdomen became markedly distended, the bowels remained constipated, and the patient presented decided symptoms of intestinal obstruction. The gauze packing was removed on the third day, and after this the symptoms of intestinal obstruction rapidly subsided, and the patient's condition became markedly improved. Bile continued to escape freely from the wound for several weeks, the patient's health improved, and at the end of four weeks the wound was firmly healed, and the passages showed that the bile was escaping by its normal route.

The patient was discharged from the hospital, April 14, in good condition. Examination of the patient, November 26, shows that she is well nourished, is in good condition, and weighs 100 pounds.

A COMPOUND FRACTURE OF THE RIGHT TIBIA AND FIBULA; GREAT CONTUSION OF THE LEG AND THIGH; COMPLICATED FRACTURE OF THE INTERNAL CONDYLE OF THE LEFT FEMUR.

DR. WHARTON presented a man, aged twenty-five years, who was admitted to the Presbyterian Hospital on the night of May 25, 1900, having been injured by being caught between cars in a freight wreck. On examination it was found that he had sustained a compound fracture of the tibia and fibula of the right leg, with great contusion of the soft parts, and an injury of the right knee and a contusion of the right arm. When seen by the reporter, about twelve hours after the injury, he found a compound fracture of both bones of the leg in the middle third, and the knee was held in partial flexion and could not be extended. The leg and thigh were greatly swollen and tense, and the vitality of the soft parts seemed threatened.

The patient was anæsthetized, and free incisions were made at several points through the skin and deep fascia to relieve the tension, which were followed by the escape of a large amount of dark blood and serum. An examination of the injured knee showed that full extension of the leg was impossible, by reason of a fracture of the internal condyle of the femur, which appeared to be displaced downward into the joint, which caused locking of the joints in attempts at extension. As the vitality of the tissues of the leg and thigh seemed doubtful, and as attempts to reduce the fragment by manipulation were unavailing, it was decided at the time to postpone any operative treatment to reduce the fracture of the internal condyle. The compound fracture of the bones of the leg was dressed with a copious sterilized gauze dressing, and moulded binder's-board splints were applied to the leg and thigh to fix the fragments. A skiagraph was taken of the knee, and it was found that a mass of bone was wedged into the knee-joint. Three weeks after the injury, as the vitality of the tissues of the leg seemed assured, the patient was etherized, an incision was made over the inner portion of the knee-joint, and the seat of fracture of the internal condyle was exposed. It was then found that the internal condyle of the femur had been separated from the shaft of the bone, and had been so turned that the fractured surface of the bone was presenting in the joint, and the articular



surface was turned towards the fractured surface of the femur. The fragment was carefully removed, a large drainage tube was passed into the joint, the ligamentous structures were brought together by chromicized catgut sutures, and the wound was closed by sutures. The fragment removed consisted of a large portion of the internal condyle of the femur, and represented a mass of bone two and one-half inches in length and one and one-half inches in width. After the removal of the fragment the leg could be placed in the extended position without difficulty. The limb was then held in the extended position and a plaster-of-Paris dressing was applied to the foot, leg, and thigh.

The patient did well after the operation. The drainage tube was removed on the fourth day by trapping the plaster bandage, and the bandage was not removed for a month. The patient was discharged from the hospital on July 29, a little more than two months from his admission, walking with crutches, and at this time there was some motion at the knee-joint. The patient was again examined on November 12, and it was then found that he was able to walk with a cane and had regained a very fair range of motion in the knee-joint.

### IMPERFORATE RECTUM.

DR. WHARTON presented a two months' old female infant, who, when three days of age, was admitted to the Children's Hospital, October 19, 1900, with the history that at birth the anus was normal in appearance, and it was only after twenty-four hours that it was noticed that no faecal matter escaped, that the child suffered from pain, that the belly became distended, and persistent vomiting occurred.

Upon examination he found the belly hard and distended. Examination of the anus showed that a probe or the tip of the finger could be introduced to a distance of an inch, and when the child cried it seemed that bulging of the bowel could be detected anteriorly. The anus was enlarged by an incision backward and the tissues were carefully divided, and when the incision had reached a depth of one and three-fourths inches, a bulging mass, resembling the rectum, was exposed in the anterior portion of the wound; this was opened by a small incision, and it was found to be the vagina. A careful dissection posterior to this failed to expose the rectum. The bleeding was then arrested by

sutures and packing, and a left iliac colostomy was made. Upon opening the peritoneum a large quantity of thin pus gushed from the wound, and the small intestine which presented in the wound was injected. The small intestine was displaced, and the descending colon was brought up into the wound and sutured to its lower angle; gauze drains were next introduced from the upper portion of the wound into the peritoneal cavity for drainage. The colon was next opened and a free discharge of meconium occurred. Upon exploring the colon through the wound with the finger, it was found that the bowel terminated in a blind pouch about the region of the promontory of the sacrum.

The child improved after the operation, the vomiting ceased, and the abdominal distention disappeared. A certain amount of pus escaped by the way of the gauze drains; they were removed on the third day, and were not replaced. The upper portion of the colostomy wound was healed in a week, and the patient had satisfactory movements through the artificial anus. And now, a month after the operation, the child is taking nourishment well and is fairly well nourished.

Under the conditions presented, the case seemed to be a hopeless one, and he was very much surprised upon seeing the case on the following day to find it doing well. The occurrence of a purulent peritonitis without rupture of the bowel was to him a matter of great interest in this case, and he regretted very much that no bacteriological examination was made of the pus which escaped from the abdominal cavity at the time of operation, to determine the nature of the infection.

#### INTERMITTENT INTESTINAL OBSTRUCTION DUE TO A BAND, SIMULATING APPENDICITIS.

DR. WHARTON further reported the case of a boy, aged nine years, who was admitted to the Children's Hospital, October 9, with the following history. Dr. Black, of Newcastle, Delaware, under whose care the patient had been before his admission, reports that for two years the patient had suffered from intermittent attacks of abdominal pain, referred to the right iliac fossa and radiating to the umbilicus. These attacks occurred at intervals of a few weeks or months, usually following the ingestion of indigestible food, and were so severe as to require the free use of morphia before he could be made comfortable, and the patient was

not completely relieved until the bowels were freely moved. There was no fever during the attacks, and after they had disappeared the boy seemed in good health, with the exception of the fact that there was some tenderness on pressure in the right iliac region.

Upon examination of the patient, the abdomen was found moderately distended, and a mass could be indistinctly located in the right iliac fossa, near the location of the appendix. The patient was kept in bed for a week and a careful watch kept, and during this time had two attacks of pain, the last one being very severe, and was only relieved by the administration of morphia and the use of an enema, which produced a movement of the bowels. From the symptoms presented, with the absence of fever, it was thought that the attacks were due either to chronic appendicitis,—a rare condition in childhood,—or to the presence of a band which caught either the appendix or the small intestine. The possibility of a calculus passing through the ureter was also considered, and the urine was examined after the attack for the presence of blood. The bladder was also examined for stone. An incision was made over the region of the appendix, and upon opening the peritoneal cavity and introducing the finger the appendix was located, and at the same time a band about three inches in length and one-eighth of an inch in width was discovered, which arose from the colon one and one-half inches above the origin of the appendix, and was attached to the pelvis near the point of exit of the iliac vessels. The appendix was long and contained several curves, and lay in contact with the band, but was not adherent to it. It was thickened, but presented no signs of acute inflammation. The band was divided, the appendix removed, and the wound closed. The patient after the operation presented no unfavorable symptoms, and was discharged from the hospital in three weeks, having had no further attacks of pain or obstruction of the bowel.

The symptoms presented in this case resembled those of intermittent intestinal obstruction by a band, but whether they were due to the appendix being caught by the band, or to the small intestine being obstructed by the band, is difficult to determine.

## TREATMENT OF INTERMAXILLARY BONE IN CASES OF DOUBLE HARELIP.

DR. WHARTON presented, also, a child upon whom he had operated for the relief of double harelip, saying that in such cases he thought it always a difficult matter to determine just what to do with the intermaxillary bone or the tissues covering that bone. The usual procedure recommended is, if the intermaxillary bone is removed, to save the flap of soft tissues which covered it, and pare it down to make a V-shaped mass and include it between the upper part of the freshened lips in bringing the parts together. This he had seen done in many cases and had done it himself, but it has a tendency to make the nose flat. Some years ago he saw several cases operated upon by Dr. Ashhurst in which he simply saved the tissues, removed the intermaxillary bone, and allowed this flap to take any position which it naturally fell into; and in some of these cases the results were quite good, taking the place of the septum of the nose, making quite a respectable septum. Recently he had adopted this procedure in several cases and found quite satisfactory results.

• DR. JOHN B. ROBERTS called attention to the fact that sometimes these mouths can be made to look a great deal better by taking a piece out of the lower lip, which is relatively too big and liable to lap over.

## OPERATIVE TREATMENT OF CIRRHOSIS OF THE LIVER.

DR. CHARLES H. FRAZIER read a paper with the above title, for which see page 715.

DR. JOHN B. DEEVER said that he had seen a cure following simple tapping in the case of a man who had every indication of cirrhosis; he was frightfully distended. He could not breathe lying down, had been sitting up in his chair for several nights previous to the tapping. The man never had a recurrence after his tap and lived three or four years. He has since died, but did not die of any symptoms referable to the liver. He was an alcoholic as well as a specific case.

DR. WHARTON said that some years ago he did an abdominal section in a case of cirrhosis of the liver for Dr. Pepper, simply opening the abdomen and draining away the fluid; and this case

improved very much for a time. He lived six or eight months, but finally died. He was very comfortable, and did not require tapping after the incision.

DR. JOHN B. ROBERTS said that he had two patients under care for sometime upon whom he expected to perform this operation. He had waited because both cases had cirrhotic kidneys as well as cirrhotic liver, and had not been in good condition. One had evidences of œdema of the lungs, and appeared to be on the verge of delirium tremens when he first saw him. The jaundice was quite marked. In both cases the urine has been scanty in amount. He intended to simply make an incision big enough to get one or two fingers into the abdomen, smooth out the omentum, and with a long curved needle make sutures through the skin and muscles, and tie the catgut sutures on the outside. It seemed to him that the rapidity with which this operation could be finished, and the fact that one only needs a small incision, would enable one to do away with general anæsthesia. Cocaine infiltration of the site of incision would be sufficient. General anæsthesia is rather risky in cases of cirrhosis of liver and kidneys, hence this method would be desirable.

[Since the discussion, Dr. Roberts has operated upon the two cases mentioned by the small incision and cocaine anæsthesia.]

DR. FRAZIER said that he had hesitated writing up this case for publication when but thirteen months had elapsed since the operation had been performed, fearing that one might advance the criticism that the results obtained were those of operation *per se*. He thought, however, that the results had been such as to warrant one in attributing them to the nature of the operation itself. As to the technique, this is in every sense of the word simple, once the operator has decided upon his plan of procedure. He must decide, first, whether he will confine his operation to the immediate neighborhood of the wound; secondly, whether he will extend his operative field to the diaphragm, liver, and spleen, and, thirdly, whether he will employ drainage. Some operators scarify not only the peritoneal surface of the abdominal wall on either side of the wound, but in addition the adjacent surface of the liver and diaphragm and of the spleen and diaphragm, thereby exciting the formation of a greater number of adhesions.

He had been loath to carry out such an extensive operation

in this case, that is, an operation which subjected such an extensive surface of the delicate peritoneum to traumatism. He therefore omitted so much of the operation as has to do with liver, spleen, and diaphragm. In almost all cases hitherto reported a drainage tube has been inserted through an additional wound in the suprapubic region, and this has not been removed until there has been no further accumulation of fluid. He was convinced that this step in the operation should be omitted; that it in no way contributes to the result, and furnishes an additional risk, for there is constant danger of the peritoneal cavity becoming infected along the drainage-tube tract. He much preferred to resort to paracentesis, should the occasion demand it, during the period in which the collateral circulation is being established.

### WRY-NECK.

DR. DE FOREST WILLARD presented several cases of torticollis; some operated upon by excision of the spinal accessory nerve; others by section of the sternocleidomastoid.

In one of the cases, three years of age, the contraction was noticed about a month after delivery by version. There had been no known hæmatoma of the sternomastoid; but it is probable that there had been an injury to the neck, or more probably to the spinal accessory during birth. The contraction was very marked, and the chin was rotated to the opposite side. The trapezius was also involved in the contraction. Section of the sternomastoid at the clavicle and sternum having failed to give relief, the child at two years of age was subjected to excision of an inch of the right spinal accessory, the nerve being reached anterior to the upper third of the muscle. Although the excision was a thorough one, the child, now one year afterwards, has no recognizable paralysis on the right side, the other muscles of the neck having assumed all necessary functions for complete movements of the head and neck; the rotation of the chin and the obliquity of the head have been almost entirely relieved, and the result is thoroughly satisfactory.

The securing of this result is undoubtedly largely due to the fact that after recovery from the operation the child was treated for several months with both active and passive gymnastic exercises of all the muscles of the neck.

Another case presented was one which had refused operation, in which the deformity had increased rapidly, so that there was marked distortion of the cervical vertebræ, with rotation. The transverse processes could be plainly felt, and the distortion of the neck had naturally produced lateral curvature of the spine. The case, which was of neurotic origin, could not be benefited except by a division of the spinal accessory, and probably of the high cervical nerves. As this has been refused, the case was being tentatively treated by strong head and foot extension in the horizontal position.

Another case was of the intermittent variety and of nerve origin. When the boy was placed upon the table for operation, the contraction, which had been confined to the sternomastoid, was found to be so entirely relieved by the anæsthetic that the operation was postponed, and he was put upon a course of neck gymnastics together with tonics, iron, strychnia, gelsemium, etc., with entire disappearance of the affection. Education in neck gymnastics was insisted upon as one of the most essential points in the cure.

Other cases of both open and subcutaneous division of muscles were also exhibited.

In his remarks Dr. Willard said: Simple cases of torticollis are so simple that a surgeon is very liable to be too hopeful in his prognosis when he first examines a complicated case. In wry-neck the differences in form, grade, and curability are most remarkable. A simple contracture of the sternomastoid may often be relieved by gelsemium or other medicinal agents; or, if permanent, by simple myotomy and gymnastics, and a perfect result secured. On the other hand, in a spastic case, or one of nerve origin, every muscle of the neck, and even the shape of the vertebræ, may be so involved that all forms of medical and surgical treatment will fail to cure. He knew of no more satisfactory results than those secured in simple cases, and he had met with few more troublesome ones than those encountered in complicated torticollis. A consideration of the causes of wry-neck shows that it is not strange that this variation exists. A simple inflammatory cause may be transient, or it may become permanent; a neurotic cause may be severe for a time, but it may be relieved by the improvement of the general condition; a continuous nerve irritation may, and usually will, prove most stubborn. Let the surgeon

therefore be wary in his prognosis until he has watched the progress of the case. Even a simple contraction of the sternomastoid continued for years may not only give asymmetry of face and eyebrow, but also of jaw, cranium, and spinal column, and many cases of lateral curvature of the spine are traceable to wry-neck.

Great care must be taken that a case of cervical spinal caries be not mistaken for a case of torticollis, especially when there is marked rigidity and fixation in an old case. Abscess of the glands, traumatism, rheumatism, myalgia, etc., must be carefully eliminated.

In the treatment of wry-neck, myotomy is usually delayed too long, and the permanent changes above alluded to then prevent a perfect cure. As to the question of open or subcutaneous section of the muscles, present aseptic methods favor the open section as the more certain procedure, except in simple forms in females. In former years, when he always operated subcutaneously, he fortunately never had an accident, but such accidents had occurred to the most capable surgeons. One case he remembered in the practice of a most skilful operator, where the top of the pleura was wounded and fatal septic pleurisy followed. The neighborhood of the great vessels at the top of the sternum always renders one anxious. If the deeper sternal and clavicular fibres are implicated, the open plan is always the best. When a contraction is of long standing, real muscle-fibre shortening has occurred; and open section of the mastoid insertion also is often necessary, the scar from which can be concealed in the hair. When complicated cases are encountered, the most serious difficulties arise. If only the sternomastoid and trapezius are affected, the spinal accessory is probably alone at fault. This nerve may be reached high up by an incision along the anterior border of the sternomastoid, or it can be reached from the posterior border. He usually preferred the former route. The nerve passes along the transverse process of the atlas, and can usually be found as it leaves the digastric muscle and passes to the posterior border of the sternomastoid a little above the level of the hyoid. Paralysis of the trapezius and the sternomastoid, more or less complete, will of course follow, but in the majority of cases this is of advantage in restoring the equilibrium of the head.

Stretching of the nerve so seldom accomplished anything permanent in his past experience, that he now always excised a large portion, an inch or more, if the nerve can be drawn out.



The complicated mechanical apparatus described in books is practically useless in any case, whether of tonic or clonic spasm. After operation, a simple cap made with circular and oblique bandages to the head is the most satisfactory. To this can be attached two elastic straps passing one in front and the other behind the shoulder, and fastened to a closely fitting waist or corset. Later, a circular occipitofrontal strap with buckle and two straps passing over the top of the head can be retained in place, from which an elastic strap can be attached to a corset or plaster-of-Paris chest-band.

The most important part of the after-treatment consists in the long-continued use of muscular gymnastics of the neck, with stretching, massage, etc. This is most helpful of all things in giving relief.

Neurectomy of the spinal accessory has not received abroad the attention which it deserves, but, following the lead of American surgery, Continental surgeons are wisely turning their attention not only to this operation, but also to resection of the cervical nerves.

When the deep muscles on both sides are affected, medicinal and hygienic measures are usually more effective than operative. Naturally, if the true cause, as in complicated cases, lies in the cephalic or spinal centres, a complete cure will not be obtained. Faulty diagnosis as to the muscles involved is probably the most frequent cause of error.

If the splenius is affected on one side, the face is rotated in that direction, while a spasm of the sternomastoid alone rotates the chin to the opposite side. Unfortunately, the complexity of the muscles involved, and oftentimes the long continuance of the contraction, has so distorted the cervical vertebræ that a complete rectification is impossible; therefore an early operation before these bony changes occur is advisable.

In the still persistent cases after section of the spinal accessory nerve, the spinal nerves should be divided. The second and third cervical spinal segments supply the sternomastoid, trapezius, and scaleni muscles, and both the second and third nerves emerge from the canal above the second spinous process. The incision to reach them, therefore, must be high up, as the distance to the foramen magnum is but short. The posterior divisions of the second and third can be reached either by transverse or by longitudinal inci-

sion, preferably the former, extending from the median line two and one-half to three inches. The trapezius must of course be cut across. The second cervical nerve, the great occipital, will probably be first seen, and may be traced through the complexus muscle, which may be divided so that an entire section of the nerve may be made back to its emergence from the spine. The first nerve lies beneath the vertebral artery, and is close to the atlas. The third cervical lies below the second cervical spine. The search for these nerves is a troublesome one.

When the rotary muscles are affected, this high division of the cervical nerve is helpful; but it must be remembered that rotation of the head may occur without involvement of these rotary muscles, especially if the splenius of one side is affected, and the sternomastoid on the other. There are many varieties of this rotary deviation dependent not only upon the muscles involved on the one side, but especially in the complicated cases, where both sides are included.

These cases of nerve origin indicate, of course, either spinal or cerebral involvement, and are therefore to be treated essentially as neuroses, whether the spasms be tonic or clonic. When the head is thrown directly backward, it is probable that both trapezii are involved. He summed up his views in the following conclusions:

(1) Wry-neck is due to such a variety of causes that the prognosis should be guarded until the actual cause is discovered.

(2) Early open section of the sternal and clavicular insertions of the sternomastoid muscle is in simple cases curative, provided the operation is followed by continued neck-muscle gymnastics. Additional section of the mastoid insertion is necessary in more severe contractions.

(3) Early operation will prevent bony distortion and resultant lateral curvature of the spine.

(4) In cases of neurotic origin, resection of the spinal accessory nerve is most helpful, and, in still more complicated cases, section of the upper cervical nerves is to be recommended.

DR. JOHN B. DEEVER asked Dr Willard if he had had occasion to resort to muscle-splitting in these cases. He operated on a lady sometime since who is said to have had torticollis for a number of years. She had no distortion of the cervical vertebrae in the shape of curvature, but had a very decided shortening of

the affected sternomastoid. He could not convince himself that the operation for the spinal accessory nerve would suffice. Therefore he exposed the muscle, split it obliquely in the central part and sewed the split ends of the muscle together. The woman secured a perfect result and remains perfectly well.

He had had occasion to do likewise in flexion of the fingers, in consequence of contraction of the deep flexors of the forearm. He had one young woman who could not extend the fingers, but by splitting all the muscles and stitching them that woman has now as good function of that hand as she has in the other hand. He never had occasion to resort to muscle-splitting in a case of torticollis except the one reported.

DR. WHARTON said that in a recent case he split the sternal tendon of the sternomastoid and lengthened the tendon by splitting, then dividing it, and then did an oblique section of the clavicular attachment of the muscle. In this case the result was very satisfactory.

DR. WILLARD said that he had employed muscle-splitting with success in just such cases as Dr. Deaver speaks of in the forearm. It acts admirably in contraction of the flexors, the section being made high in the forearm instead of cutting off the origins of the muscles at the elbow. He had never used it for torticollis. It would seem to him that any case that would be benefited by such a section would also be benefited by simple myotomy, open or subcutaneous, of the sternal and clavicular attachments of the sternomastoid. He saw no objection, however, to the operation, and it might be safer because the muscle could be lifted out and the section need not be made as near to the root of the neck in the proximity of the great vessels. At the base of the neck we are liable to meet with accidents more than any other part.

#### PLASTER OF PARIS AS AN IMMEDIATE DRESSING AFTER FRACTURE OF THE LEG.

DR. WILLIAM G. PORTER presented two boys, brought from the hospital to illustrate the application of a dressing which he had been using for a long time in the treatment of fractures of the leg. He demonstrated this dressing before the Academy a few years ago. It is a plaster-of-Paris dressing which is applied in the following way. The limb is first carefully set under ether if necessary, firmly held in position, and a flannel roller bandage

carefully applied from the roots of the toes to above the knee-joint about the junction of the middle and lower thirds of the thigh. A block tin tape is then placed on the front of the limb, moulded accurately to it and held in position. The plaster-of-Paris bandages are then applied in the ordinary way, and are at once cut through with a sharp knife on the block tin tape as a guide, which is then removed and an ordinary muslin roller bandage applied over all to secure the dressing. He had used this dressing for the last fifteen years as a routine dressing in all cases of fracture of the leg, applied at once as soon as he took charge of the case. There is no preliminary treatment by a fracture-box or any other appliance. If there are blebs, either serous or sanguineous, they are evacuated and boric ointment, or some similar application, used. If the case is seen early and the dressing is promptly applied, there is, as a rule, no inflammatory swelling such as usually follows such fractures when treated in a fracture-box; and even should inflammatory swelling appear, the plaster having been split down yields, and there is no danger of strangulation, as there would be in a fixed and immovable plaster dressing. These two boys illustrate both the immediate application of the dressing and one of them its application to a case in which there was great contusion, the formation of blebs, and danger of the formation of a compound fracture by sloughing of the integuments. With this dressing a patient can occupy any position in bed which is most comfortable for him. He can sit up in a chair; can walk on crutches, and frequently, by means of it, can attend to his business during the whole time of the treatment of his fracture. If there is much contusion, the block tin tape is applied directly to the skin under the flannel bandage. If not, it is applied, as described, outside of it, and on the following day the cotton roller is removed and the folds of the flannel bandage are cut through with a pair of scissors, the limb inspected, any applications which may be needed made to it and the cotton roller reapplied. Any one who has been compelled to lie with his limb in a fracture-box for weeks must appreciate the advantages of this dressing.

DR. JOHN B. DEEVER said that since Dr. Porter made his first communication to this Academy, they had practically put it into effect in the German Hospital. They scarcely know what a fracture-box looks like. They put them up as Dr. Porter has in-

dicated immediately upon their being received in the hospital. It is especially applicable to children. In cases developing delirium tremens and traumatic delirium it is particularly good. The precaution of following out Dr. Porter's instructions of cutting down is essential, so as to avoid gangrene, which is known to occur. He had had quite warm discussions with his house doctors as to putting a limb up in plaster which was greatly swollen. The next day he would find that the patient was in splendid condition, much more so than before he was dressed. That was their experience in the majority of cases; of course, there are exceptional cases. They do not confine it to simple fractures, but extend it to compound fractures; and all know that it relieves anxiety and makes the convalescence a pleasant one in comparison with our former mode of treatment with the fracture-box.

DR. WILLARD said that in his experience there was no plan of treatment of fractures in children that is at all comparable with the proper application of plaster. In fractures of the thigh it is essential to fix the hip-joint, carrying the dressing from thorax to toes. A child then cannot displace his limb; you can move him about, carry him up-stairs and out-doors with perfect satisfaction and without any danger of disturbing the fragments. When properly used, this plan of treatment secures absolute rest to the fragments, maintains thorough apposition, and yields the very best results.

# TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY.

*Stated Meeting, February 1, 1901.*

EDMUND ANDREWS, M.D., in the Chair.

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## FRACTURES INVOLVING THE HIP-JOINT.

DR. SAMUEL C. PLUMMER read a paper on the "Pathology and Diagnosis of Fractures involving the Hip-Joint."

DR. JOHN E. OWENS read a paper on "Complications of Fractures involving the Hip-Joint," for which see page 726.

DR. JOHN RIDLON read a paper on "Treatment of Fractures involving the Hip-Joint," for which see ANNALS OF SURGERY, July, 1901.

DR. EDWARD H. OCHSNER said there was one complication in fractures of the hip-joint which he believed was accountable for a great many of the failures following their treatment. He referred to the possibility of the fractured end turning. If in a fracture of the neck of the femur the teres ligament was torn at the same time, there was nothing which would keep the head in its position. If the head turned so that its articular surface was opposed to the fractured surface of the neck, there was absolutely no chance for union to take place. This complication he believed occurred much more frequently than was generally supposed. If statistics could be relied on, it was known that so-called short fractures of the neck of the femur occurred most frequently in the aged. Furthermore, non-union was more common in the aged than in the young. The common cause for non-union of hip fracture in the aged had been ascribed to age. It was known that age did not prevent union from taking place anywhere else, and why should it here? According to statistics and personal experience, all other bones of a woman of seventy healed just as readily as the broken bone of a child of five. Why, therefore, should fail-

ure of union be ascribed to age in this particular fracture? Would it not be more reasonable to suppose that non-union in the aged was caused by the fact that the fracture was more often near the head of the bone, so-called short fracture, and that the head rotated, making union impossible.

Four years ago he assisted his brother (Dr. A. J. Ochsner) in an operation where this pathological condition was found. The patient, a man, had been treated by an expert surgeon by the ordinary methods, but even after several years there was no union. All of the symptoms of fracture except crepitus existed. The fracture was cut down upon, and it was found that the *teres ligament* had been torn, that the fractured surface of the head was opposed to the acetabulum, and the articular surface pointed outward, so that there was no possibility of union, no matter what treatment might have been instituted. The head of the femur was removed and, considering the condition, the man made an excellent recovery, being able to walk with crutches.

The statement of Hoffa, that chloroform or any anæsthetic should not be administered in a case of fracture of the hip-joint or of the femur, was very dangerous teaching to follow, for any one who has seen a single undiagnosed dislocation and the unhappy results that occur after it, will probably never follow such directions. Any surgeon who is competent to treat a fracture of the hip at all must have enough judgment not to undo an impacted fracture. In a case of fracture of the hip, the administration of an anæsthetic was indicated, in spite of what Hoffa had said on the subject.

He was inclined to think that surgeons in the past ascribed altogether too much to immobilization. From his experience and the results he had seen in treating fractures of the femur, it was not absolutely necessary to resort to immobilization to the extent that it had heretofore been practised and advocated by some surgeons. He had treated three fractures of the neck of the femur, and he had seen eight other cases treated by his brother. In ten cases out of eleven the results were very good. He had not attempted exact immobilization. With such good results without perfect immobilization, no one could make the statement that immobilization was one of the essential features in treating fractures of the neck of the femur. The eleventh case died from hypostatic pneumonia on the fifth or sixth day. The method of treatment

which he had used was a combination of the modified Hodge's splint and the Buck's extension. (Here Dr. Ochsner exhibited a model of the modified splint which he used in cases of fracture of the femur, and demonstrated its application.) Of the eleven cases reported by him, all of the cases, with the exception of three, were over fifty years of age. Any splint which caused discomfort and pain was a bad splint, in his opinion. If any splint caused pain, it simply showed that the surgeon had not mastered the particular fracture, and any splint applied in a case of fracture of the femur which caused discomfort and pain should be discarded. The modified splint described by him did not cause discomfort or pain, providing it be properly applied. It must be so applied that the limb swings perfectly free from the bed, the weight must be distributed evenly, the foot must extend vertically, *i.e.*, eversion must be guarded against above all things, and the proper amount of weight must be applied to the Buck's extension, so that the limb is the proper length and the contraction of the muscles is just overcome. This will require the weight to be from one-fifteenth to one-tenth the weight of the patient's body, according to the degree of muscular development.

He emphasized the point that absolutely immobilization was not necessary, as had been conclusively demonstrated in the eleven cases previously referred to.

DR. ARTHUR DEAN BEVAN made a plea for the old and time-honored division of fractures into intra- and extracapsular. If we examine the neck of the femur and the attachment of the capsular ligament to it, it will be found that anteriorly it is attached to a spiral line which runs down from the great trochanter into the *linea aspera*. Almost the entire anterior surface of the neck was within the capsule. In the posterior portion of the neck the attachment of the capsule is at a point corresponding to a line of division about midway between the intertrochanteric line and the articular surface of the femur. The old division of fractures into intra- and extracapsular was a good one, because as a matter of fact union does not follow in a fracture within the capsule the same as in a fracture of the shaft of the femur, because the amount of blood supply furnished by the *ligamentum teres* to the upper fragment is not sufficient to establish union. In fracture of the neck of the femur we must accept that the all-important factor which prevents union is the lack of blood supply in the small



fragment which is found, to all intents and purposes, intracapsular, and almost entirely cut off from blood supply. \*

The statements made by Drs. Ridlon and Ochsner in regard to treatment were too enthusiastic. When Dr. Ochsner made the statement that he had ten good results out of twelve, he could not have meant that union had taken place, but that they were to his mind good functional results. What would satisfy one surgeon in the matter of a good functional result would not please another, and how many patients out of the ten would be satisfied with the result? In making such enthusiastic statements, they should be qualified. He asked whether Dr. Ochsner had obtained any bony union in his cases, to which Dr. Ochsner replied that he did not know. How could bony union be obtained in a case where the X-ray picture showed that the articular portion of the bone was cut off from all of the rest of the bone? The speaker did not believe bony union could be obtained in such a case, even if the fragments were nailed or wired together, let alone by applying any method of conservative treatment whatsoever.

The X-ray had thrown a great deal of light on the class of fractures under discussion.

He reported a case which he had diagnosticated as one of traumatic neurosis. A woman fell, and her case pursued the clinical course of a fracture of the neck of the femur. He examined her carefully and could not make out any shortening under an anæsthetic, and he could not elicit any evidence of fracture under chloroform. Within a short time thereafter an X-ray picture was obtained and an impacted fracture found. He was never able to obtain any motion. The amount of shortening was slight. The woman was very stout. She was probably five feet six inches in height, and weighed 200 pounds. Functionally the result was bad.

He mentioned another case which he thought was an old fracture of the neck of the femur at first, but which, after an examination by the X-ray, proved to be a fracture just below the great trochanter. In operating and removing a V-shaped section in order to correct deformity he found a thin shell of bone, and in the centre of that bone was a mass of fibrous tissue which he at first thought was possibly an osteosarcoma, but which proved to be granulation tissue. The value of the X-ray was shown in this case, as without its use it would have been impossible to have

made a diagnosis. Since the days of Hamilton we have advanced in our ability to diagnose these cases, but he could not see any advance that had been made in treatment.

DR. RIDLON, in closing the discussion, said the fact that there is union shows there is blood supply to the part, or else that there can be union without blood supply. As to what is a good result, each surgeon has his own standard. If a man, eighty-two years of age, recovers with no more than five degrees of outward rotation, with no flexion or deformity, with only three-quarters of an inch shortening, is able to walk without a cane or crutch, and without much limp, he considers the result good. If a woman, who weighs 210 pounds, recovers with one-half-inch shortening, with fifteen degrees outward rotation, and walks without a cane, but with a slight limp, the result is good.

## INDEX TO SURGICAL PROGRESS.

### VASCULAR SYSTEM.

I. Results of Trendelenburg's Operation for Varicose Veins. By DR. J. GRZES (Innsbruck). Ligation of saphena magna was performed on seventeen patients twenty-six times under infiltration anæsthesia; silk constituted the material used for ligature and suture.

Thrombosis of slight extent was twice experienced, and on the whole the results were highly satisfactory, even in its influence on ulcers of the leg. Thrombosis if the condition of the wound is aseptic need not be feared.

Conjointly with his own, 498 cases under control, were analyzed and showed a permanency as to cure in 76.6 per cent. of the cases. Yung's analysis offers a still better showing. Out of 355 cases, 86.2 per cent. were permanently cured.

Among twenty-six persons operated twice, recurrence was traceable to an anomalous vein running parallel to the saphenous, and again an anomalous emptying of external saphenous into saphena magna. To offset such possibilities, a high ligation as near as possible to confluence with femoral vein ought to be the site chosen; mere division of vein must give way to the better procedure of resection of a variable length (five to ten centimetres). A compression test of the saphena magna should be a preliminary to every operation to ascertain the arrangement of the venous supply. This relative dangerless operation, with its high percentage of good, is of great value in rendering fit for military service a percentage of thirty debarred because of this defect. (Hence we can also estimate its service in civil practice.)

—*Beiträge zur klinischen Chirurgie*, Band xxviii, Heft 2.

## HEAD.

I. **Exenteratio Cranii.** By PROFESSOR DR. R. A. KROENLEIN (Zurich). Some hitherto unrecorded effects of high-velocity bullets (Swiss rifle), when delivered from the immediate vicinity, are worthy of note because of the miraculous phenomena ensuing, and because of their medico-legal import. An account of three cases is here rendered in which the firing distances of seven centimetres and less resulted in penetrating gunshot wound of the skull; and said wounds, though small, in one instance was associated with total evisceration and instant death, and in two other cases, while much of the brain was massed about the entrance and exit wounds, recovery set in. Exenteratio cranii is characterized by expulsion en masse in greater or less extent of intact brain from the calvarium. It is maintained that neither the expansion of the powder gases nor the increased hydrostatic pressure offer the right accounting for this condition. In the fatal case, the brain, *in toto*, was found at a distance of thirty centimetres from the corpse torn off at the medulla. There was extensive fissuring of the skull, and two large segments of bone lay some distance from the corpse. This injury was accidentally inflicted by a private stationed in the rear of the victim, and all these statements were legally confirmed. Where the extent of brain traversed is small, the course of the bullet and its forces are tangential, and, though the firing distance was no more than a few centimetres, the issue was not fatal to life. The cases are too few to afford a reasonable explanation, and only similar repeated observations on the living will account for this phenomena. —*Beiträge zur klinischen Chirurgie*, Band xxix, Heft 2.

## ABDOMEN.

I. **Arrosion Hæmorrhages in Perityphlitis.** By DR. E. EHRLICH (Rostock). The already protean picture of appendicitis is further enriched by this communication of the erosion in

two instances of the larger vessels in proximity to the inflammatory process. The first case occurred in a male aged twenty-one years. The symptoms of perforative appendicitis were associated with a large exudate occupying the iliac fossa and reaching to the psoas. In the course of four weeks, regressive changes set in, so that barely any resistance could be made out. Suddenly an aggravation of the condition set in characterized by a very rapid reappearance of a large mass in the iliocostal region, rapid pulse, and a rise of temperature in twenty-four hours. This afforded an indication for operative interference.

*Operation.*—Incision with the idea of effecting drainage through a retroperitoneal incision. In the act of peeling off the thickened peritoneum, one ounce of pus escaped, followed by a stream of fluid blood coagula and masses of fibrin. Digital exploration outlined a cavity extending to the spine up to the pancreas and out as far as the kidney. The cavity was extraperitoneal. A counteropening was made at the outer margin of the sacrolumbalis. This case recovered.

The second case, a girl of fourteen, was laid low with appendicitis for two weeks. An exudate extended into the pelvis and to the left iliac region. Rectal incision followed by free flow of blood. The presence of coagula partly organized and masses of fibrin show that the vessel was not injured at operation. An iodoform tampon controlled the hæmorrhage. Delay to operate in the first case was based on the collapsed condition with eventual signs of improvement. From a diagnostic stand-point the sudden accession of a larger area of dulness might suggest a hæmorrhage, and will in the future be taken into consideration; yet Sonnenberg narrates serofibrinous exudates attaining a larger size in a few hours. The site of the hæmorrhage was in all likelihood one of the larger iliac vessels; in support of which a number of instances from American literature are quoted where secondary hæmorrhages were all located in iliac vessels.—*Beiträge zur klinischen Chirurgie*, Band xxix, Heft 1.

II. The Rectal Incision of Perityphlitic Abscesses. By DR. O. LANGEMAK (Rostock). The author champions the rectal drainage of perityphlitic exudates that present themselves in the pelvis and are palpable per rectum.

Based on successful efforts of nature to thus effect a spontaneous cure the technique is thus outlined. Under narcosis the sphincter is dilated, and with the aid of a speculum the exploring-needle is thrust into the exudate. On the appearance of pus, the needle is left as a guide upon which but a small incision is made, then to be dilated with forceps. This opening, while sufficient to effect thorough drainage, must not be too large for the drainage tube which is enveloped in iodoform gauze. To prevent the tube slipping, it is sutured to the edge of the wound. Daily irrigations through the drainage tube are performed. Opiates are given during the first days after operation. If the tube slips, it might be replaced, but five to six days are sufficient time for its remaining. The erect posture is to be assumed as soon as possible, to still farther favor drainage supplemented by sitz-bath. When the rectal wound is healed, the abdominal route can be chosen with the safety peculiar to the interval operation, and with the additional security, of the avoidance of a hernia.

The fears of secondary infection from the rectum are purely theoretical, and not borne out by practice. Abscesses on either side of the pelvis may thus be drained. Any hæmorrhage occurring may be controlled by tamponade. Analogous to this technique is drainage by vagina in females or the perineal or parasacral route in males.—*Beiträge zur klinischen Chirurgie*, Band xxix, Heft 1.

## GENITO-URINARY ORGANS.

I. Beck's Operation for Hypospadias. By DR. G. MARWEDEL (Heidelberg). Beck's method was put to test in seven children between the ages of one and nine years. In none of the instances was the distance of the urethral orifice from the glans

penis more than one and one-half centimetres. The glans penis was split and not tunnelled with the trocar, since the already flattened glans penis did not lend itself to the latter procedure, though it possesses some marked advantages. All hæmorrhage could be controlled by pressure. The dissection to mobilize the urethra was not difficult, nor ever inflicted any injury. The average length of the urethra prepared was two centimetres. Towards the base of the urethra, where the relation, with the corpus cavernosum, is very intimate, hæmorrhage is freer, but controllable by pressure. Among the disturbances encountered are early cutting through of the sutures, resulting in retraction of the urethra to its original site. In small infants, it is impossible to prevent soiling and disturbance of the dressing. Erections often caused cutting of ligatures. In one instance the formation of a large hæmatoma caused such gaping of the wound that Thiersch's method was resorted to. Three times successful result was obtained with a single operation, and in two others only after a repetition of the operation. These second operations were easier and pleasanter than the first because the new connective tissue was easier to handle and fix in a new place. A catheter *en-demeure* was found of benefit during the first three days. The failures recorded occurred at a time when no catheter was employed. Though no necrosis was met, yet twice at the inferior angle a small fistula persisted, caused by traction of the urethral wall embedded at its new site. The treatment of the fistulæ was rebellious. Notwithstanding these few slight drawbacks, it is the author's opinion that this operation merits a liberal recommendation for its widespread application.—*Beiträge zur klinischen Chirurgie*, Band xxix, Heft 1.

MARTIN W. WARE (New York).

II. Remote Results of the Operative Treatment of Prostatic Hypertrophy. By DR. LEGUEU. The author reviews the results of various methods of operating on the hypertrophied pros-

tate. Cystostomy should be a last resort, and is purely a means of palliation. The results from castration are unequal. Out of sixty-eight cases observed from eight to four years after operation, only four presented distinct atrophy of the gland, forty-one showed some diminution, while in twenty-three the gland was either unchanged or had enlarged.

Resection of the vas deferens is inefficient; in favorable cases it is followed by a slight improvement, but this is only temporary. The most favorable results apparently are those obtained from Bottini's operation, but not infrequently recurrence is noted after four to five months. The mortality of this operation is 5 per cent. The best results may be expected in cases of localized obstruction.

Suprapubic prostatectomy has a mortality of from 5 to 15 per cent., and is naturally only suitable for cases of isolated hypertrophy of the middle lobes. Out of 333 collected cases, the hypertrophy was limited to the middle lobe in 121, in 156 both middle and lateral lobes were involved, while in fifty-six the trouble was in the lateral lobes alone. After eliminating the operative deaths and cases insufficiently followed, 242 cases remain, of which 140 were cured or improved, and in 102 the result was negative.

Perineal prostatectomy had not been practised sufficiently long to permit of a review of the ultimate result.—*La Presse Médicale*, 1900, No. 8.

JOHN F. BINNIE (Kansas City).



## REVIEWS OF BOOKS.

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THE TREATMENT OF FRACTURES. By CHARLES L. SCUDDER, M.D., Assistant in Clinical and Operative Surgery, Harvard Medical School. Second edition, revised and enlarged. Octavo. Pp. 433, with nearly 600 original illustrations. Philadelphia and London: W. B. Saunders & Co., 1901.

This is an altogether admirable book, eminently practical in its character. It is plainly an attempt on the part of the author to present to his readers what he himself has seen, and the methods of treatment proven to be of especial value in his own work. Perhaps a little less personal scope may be attributed to it, and it may be taken as an exposition of the methods of the Boston School of Surgeons as a whole. The title of the book defines its scope; it is not a treatise on fractures, but a manual of "The Treatment of Fractures," hence, when one misses the usual preliminary discussion of the considerations pertaining to fractures in general, such as classification, etiology, diagnosis, mode of healing, delayed and vicious union, complications, etc., one cannot complain, for the author has not undertaken to furnish it. Nevertheless, in dealing with individual fractures, the author does often consider with considerable fulness symptoms, methods of examination, and diagnosis.

The most noticeable feature of the book is the number and character of the illustrations, which are introduced with a profusion and a clearness of execution and appropriateness of subject that add very much to the value of the text, and suggest again and again the presence of a demonstrator who is exhibiting in detail the practical application of the methods of treatment he

advises. Thus, in so common and simple a matter as the application of a dressing to a fractured forearm, seven different cuts are given illustrating the different steps from the beginning of the application of the splints to the forearm to its final suspension in a sling. Reproductions of skiagraphs are used sparingly, but very free use of tracings made from X-ray plates is resorted to, greatly to the advantage of the subjects.

A separate chapter, consisting mostly of illustrations, is given to the employment of plaster of Paris as a dressing for fractures. The author has a genius for illustrating, and the result is instructive as well as attractive.

The book closes with a chapter devoted to the ambulatory treatment of fractures, in which the subject is very conservatively and judiciously treated. The claims of its advocates, and the objections to and difficulties of its practice, are both well stated.

LEWIS S. PILCHER.

MINOR SURGERY AND BANDAGING. By HENRY R. WHARTON, M.D. Third edition. Four hundred and seventy-five illustrations. Philadelphia and New York: Lea Brothers & Company.

In this, the third edition of Wharton's "Minor Surgery and Bandaging," the subject-matter contained represents much more than its title would indicate.

Bandaging receives first consideration, and the numerous excellent illustrations of the various regional bandages assist very much in the author's description of their uses, varieties, and methods of application.

The theory of asepsis and antisepsis is handled concisely, together with the methods of preparation of surgical dressings, suture material, the hands of the surgeon, and the field of operation.

There are well-written chapters on anaesthetics, the control

of hæmorrhage, and the management of clean and infected wounds, burns, ulcers, bedsores, and sprains.

Then such minor surgical procedures as the use of the cautery, catheter, and aspirating-needle are considered.

The sections on fractures and dislocations are as thorough as brevity will allow, and include excellent descriptions of the application of splints, plaster-of-Paris dressings, and extension apparatus.

The latter part of the book is given to ligation of arteries, amputations, excisions, and resections, in addition to descriptions of operations on tendons and nerves, the operation of tracheotomy, and intubation of the larynx. This part of the work is intended more especially as a help to those who are practising operative surgery on the cadaver. The illustrations, which are numerous and of marked clearness, add greatly to the attractiveness of this book. It should prove to be an excellent guide to students in general, and of special value to those who are about to begin their work as hospital internes or assistants in the surgical clinic of a dispensary.

WALTER A. SHERWOOD.

PROGRESSIVE MEDICINE. Edited by HOBART AMORY HARE, M.D.  
Vol. iv, December, 1900. Lea Brothers & Co., 1900.

In this volume we find much of surgical interest. Methods of diagnosis and treatment of stomach diseases are exploited. Perforating duodenal ulcer is reviewed in the light of Weir's recent paper on that subject. Under the treatment of appendicitis, we find Richardson's statement that the appendix should be removed if the diagnosis of appendicitis is made in the first hours of the attack. After the early hours, he advises operation if the symptoms are severe, and especially if they are increasing in severity; if the symptoms, after a marked improvement, recur, and if the symptoms, even though moderate, do not improve.

Obliteration of the receptaculum chyli is made the subject of review. It would seem from the evidence collected that obstruction of this duct is characterized by extremely rapid emaciation as the most prominent sign. Smith says, "It would seem that when with symptoms of disease in or about the stomach we have more rapid emaciation than can be otherwise explained, we are justified in making the diagnosis of probable obliteration of the receptaculum chyli, and that this probably will be increased to a very strong presumption if there are in addition rather copious, pale, semi-fluid passages from the bowels."

The chapter on floating liver is an essay on that subject. Evidently the lesion is not an uncommon one. Thirty of Glenard's cases were in women and only two in men. The author of this particular chapter is not in favor of operating upon either floating liver or floating kidney, but advocates mechanical support and diet.

The methyl-blue treatment of gonorrhœa is described. Tuberculosis of the kidney and renal hæmaturia are discussed. It is the general opinion that an angioneurotic bleeding does not exist, but that hæmaturia is always the result of a local disease of the kidney, such as chronic nephritis, floating kidney, hydronephrosis, and early tuberculosis. The hæmostatic effect of gelatin is referred to.

A considerable amount of literature is collected bearing upon that small but constant portion of the Müllerian duct called the utricule. Until this year medical literature contained but two references to the clinical aspects of this organ. The author says that "there can be little doubt that the condition commonly termed prostatic abscess and relieved by a gush of pus into the deep urethra is frequently an utricular abscess."

In a chapter written by Dr. J. C. Bloodgood are considered, among other subjects, the cocainization of large nerve-trunks to block afferent impulses and prevent shock, researches into the cause of collapse or death from blows upon the lower chest and

epigastrium, and the importance of blood examinations in reference to general anæsthesia and operative procedures. "Mikulicz makes it a rule never to operate on a patient whose hæmoglobin is under 30 per cent." This article shows how that safety in anæsthesia depends upon the presence of a certain amount of hæmoglobin.

From the studies of tetanus, it would seem indicated to inject with tetanus antitoxin all recent cases of wounds which have been contaminated with earth, especially in those districts in which tetanus is common.

The chapter devoted to tuberculosis of the bones and joints is a particularly valuable one.

The highest degree of literary excellence and the best surgical judgment combine to make these volumes of "Progressive Medicine" of value to the student and practitioner of surgery.

JAMES P. WARBASSE.

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ANNALS OF SURGERY,

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# INDEX.

- ABDOMEN**, Drainage, after herniotomy, 508; Gunshot wounds of, 474; Modified incisions for opening, 489; multiple gunshot wounds of, Recovery after abdominal section, 311.
- Abdominal wall, Resection of the pendulous, fat, 299.
- Actinomycosis, treatment by iodide of potassium, 353.
- ALEXANDER, SAMUEL, Papilloma of the bladder, 641.
- American Surgical Association, Transactions of, Vol. xviii, 1900, Review of, 223.
- American Year-Book of Medicine and Surgery, 1901, Review of, 669.
- Amputation, Osteoplastic, of the arm, 636, 709.
- Anal fistula, Epithelial-lined, 221.
- Anastomosis of hollow viscera, A new instrument to facilitate, 179, 207.
- ANDREWS, E. WYLLYS, Ileus, 498.
- Aneurism of external iliac artery, Extirpation of, 473.
- Aneurismal varix of the skull following fracture of the base, 339.
- Angina Ludovici, 720.
- Angioma of tongue, 659.
- Ankle, Neuropathic, due to locomotor ataxia, 491.
- Anuria, non-obstructive, post-operative, 225, 336, 342.
- Aorta, abdominal. Aneurism of, 640.
- Appendical abscesses, Rectal incision of, 809.
- Appendicitis, Arrosion hæmorrhages in, 807; Errors in diagnosis in conditions resembling, 594, 629; Rare complications after operations for, 605; with left-sided abscess, 772, 773; followed by abscess of lung and gangrene of gall-bladder, 761; Posterior incision in certain cases of, 764; Review of George R. Fowler's treatise on, 510; Simulated by perforating gastric ulcer, 212.
- Appendix, Relation of, to the psoas muscle, 387.
- Ascites, Operative treatment of, by omental fixation, 653, 663, 715, 791.
- BACILLUS** *aërogenes capsulatus* causing emphysematous gangrene, 758, 768.
- BAILEY, PEARCE, Operative paralysis of the spinal accessory nerve, 558.
- BANGS, L. BOLTON, Treatment of tubercular cystitis, 334; Hydatid of the prostate, 565, 753.
- BARTLETT, WILLARD, Excision of intact Gasserian ganglion, 683.
- BECK, CARL, Contribution to the surgery of multilocular renal cyst, 147; Fissure of the head of the radius, 466; Tendon transplantation, 660.
- Berliner Rettungs-Wesen. Review of Bergmann's pamphlet on, 222.
- BEVAN, ARTHUR DEAN, Hip dislocations, 75; Retropharyngeal

- traumatic aneurism, 341; Diagnosis of stone in the kidney by the X-ray, 239, 343, 348; Classification of forms of ileus, 495; Diagnosis of appendicitis, 630; Fractures involving the hip-joint, 803.
- BEYEA, H. D., Carcinomatous degeneration of uterine myoma, 61.
- BINNIE, JOHN FAIRBAIRN, Critical suggestions on cleansing the surgeon's hands, 349.
- Bladder, multiple papillomata of, Extirpation, 198; Large stone in the, 347; Papilloma of, 641; Stone in, with shot as nucleus, 647; with twig of tree as nucleus, 648; with leather shoe-string as nucleus, 648; Tuberculosis of, treated by permanent suprapubic drainage, 331.
- BLAKE, J. A., Plastic operation for restoration of nose, cheek, and soft palate, 764; Bilateral growth of the gums, 765.
- Blood, Freezing point of, as an index to kidney function, 96.
- BOLTON, PERCY R., Spina bifida, 50; Colitis treated by valvular colostomy and irrigation, 753.
- Bowel, Anastomosis of, O'Hara's forceps to facilitate, 179, 207; strangulation of, Operation under spinal anæsthesia, 203; Suture of, by O'Hara's method, 650; Perforation of, from kick of gun, 648.
- Bowels, Gunshot wound of, 474; Obstruction of, due to mechanical arrest of fæcal current, 449; due to neoplasms, 457; by a band, 789; due to gall-stone, 634.
- Breast, Long-lasting immunity after removal of carcinoma of, 201.
- BREWER, GEORGE E., Traumatic subdural hæmatoma, 328; Extirpation of iliac aneurism, 473; Resection of intestine for gunshot wounds, 474; Compound depressed fracture of skull, 491; Some errors in diagnosis in conditions resembling appendicitis, 594; Emphysematous gangrene caused by bacillus *aërogenes capsulatus*, 758; Appendicitis followed by abscess of lung and gangrene of gall-bladder, 761.
- BROWN, F. TILDEN, Treatment of tubercular cystitis, 335; Non-obstructive, postoperative anuria, 225, 336; Nephrectomy for tuberculosis, 478.
- BRYANT, JOSEPH D., Artificial nasal bridge, 45; Traumatic cubitus varus, 48.
- CANCER, Cases of, suggesting transmission by contagion, 492.
- Carbolic acid, Pure, as an infection into hip-joint abscesses, 657.
- Cervical sympathetic ganglia, Excision of, for exophthalmic goitre, 469.
- Chicago Surgical Society, Transactions of the, 75, 339, 494, 653, 801.
- Cholecystectomy, 188, 189.
- Cholecystitis, Acute, complicating typhoid fever, 68; Gangrenous, after appendicitis, 761.
- Cholecystostomy, 785.
- COLEY, WILLIAM B., Lumbar hernia, 51; Diagnosis of appendicitis, 632.
- Colitis treated by valvular colostomy and irrigation, 753.
- Colon, Traumatic rupture of the ascending, 626.
- COOLIDGE, F. S., Some new points in tendon surgery, 582.
- Coxa vara, Initial stages of, 99.
- Cranii, Exenteratio, 807.
- Cubitus varus, Traumatic, 48.
- CURTIS, B. FARQUHAR, Cicatricial stricture of the pharynx cured by plastic operation, 152; Operation

- for liver abscess, 192; Postoperative anuria, 338; Neuropathic ankle due to locomotor ataxia, 491; Traumatic torticollis, 628.
- CUSHING, HARVEY, Concerning prompt surgical intervention for intestinal perforation in typhoid fever, 544.
- Cystitis, Tubercular, treated by permanent suprapubic drainage, 331.
- D A COSTA, Modern Surgery, Review of, 361.
- DAVIS, EDWARD P., Obstetric fractures of the femur, 779.
- DAVIS, GWILYM G., Laryngectomy under eucaïne anæsthesia, 32; Anastomosis of bowel, 208; Tubercular peritonitis, 211; Dislocations of the toes, 643; Operation for perforation of bowel in typhoid fever, 647.
- DAWBARN, ROBERT H. M., Artificial bridge of the nose, 42; Traumatic cubitus varus, 48; Posture after nephrectomy, 336; Results of operations for severe fractures of the skull, 323; Extradural hæmatoma, 329; Traumatic torticollis, 627; Diagnosis of appendicitis, 634; Osteoplastic amputations, 637; Sterilization of knives, 639.
- DEAVER, JOHN B., Nephrolithiasis, 71; Hydronephrosis, 72, 73; Left-sided abscess of appendical origin, 775; Operative treatment of cirrhosis of the liver, 791; Muscle-splitting in wry-neck, 797; Plaster of Paris in treating fracture of leg, 799.
- Diaphragm, Wound of the, 651.
- Dislocations of the toes, 643.
- DOWD, CHARLES N., Long immunity from recurrence after removal of epithelioma of lower lip, 51; Long-lasting immunity after excision of carcinoma of the breast, 201; Postoperative anuria, 337.
- DUNHAM, THEODORE, Abscess of the liver, 757.
- Dysentery, amœbic, Surgical treatment of, 574.
- E ADS, B. BRINDLEY, Ventral hernia following abdominal section, 1.
- EASTMAN, JOSEPH, Relation of displacement of kidney to formation of renal calculi, 343.
- Echinococcus of the liver, 755.
- Ectokelostomy, 508.
- Ectopic pregnancy, 640.
- EHRENFEST, HUGO, A new knot-tightener, 743.
- EISENDRATH, DANIEL N., Postoperative anuria following nephrotomy, 342.
- ELIOT, JR., ELLSWORTH, Exostosis of shoulder simulating dislocation, 53; Fracture of humerus with marked displacement, 54; Echinococcus of the liver, 755; Osteoma of palate, 766.
- Emphysematous gangrene, 758, 768.
- Enterorrhaphy, 650.
- ERDMANN, JOHN F., Strangulation of bowel operated on under spinal anæsthesia, 203; Fracture of the patella, 488; Ectopic pregnancy, 640.
- Excision of the wrist, 58.
- F ACE, Plastic operation for deformity of, 764.
- Fæcal current, Mechanical obstruction of, as a cause of ileus, 448.
- Fallopian tube, Hernia of the, 247.
- Femur, Fracture of, in infants during delivery, 775; Fracture of internal condyle of, 787.
- FENGER, CHRISTIAN, Traumatic aneurism of the palate, 342; Diagnosis of renal calculi, 347; Conservative operations for renal



- retention, 369; Ileus, 494; Loop around the hyoid bone as an aid in narcosis, 673.
- FERGUSON, ALEXANDER, Diagnosis of renal calculi, 346.
- FISK, ARTHUR L., Traumatic rupture of the ascending colon, 626; Traumatic torticollis, 628.
- Forearm, Open fracture of the bones of the, infected by bacillus *aërogenes capsulatus*, 768.
- Fowler's Treatise on Appendicitis, Review of, 510.
- Fractures, cases of compound or complicated, Value of operative interference in, 171, 205; Hopkins's Clinical Treatise on, Review of, 108; The Treatment of, Review of Scudder on, 812.
- Fractures and Dislocations, Stimson's Treatise on, Third Edition, Review of, 107.
- FRANK, JACOB, Classification of forms of ileus, 496; Congenital angioma of tongue, 659; Tendon suture, 661.
- FRAZIER, CHARLES H., Operative treatment of cirrhosis of the liver, 715, 792.
- FREEMAN, LEONARD, Sarcoma of femur; Ligation of common iliac artery, amputation at hip-joint and removal of part of pelvis, 318.
- Fuller on Diseases of the Genito-Urinary System, Review of, 106.
- GALL-BLADDER, Extirpation of the mucous membrane of the, 192; Gangrene of, after appendicitis, 761.
- GALLAUDET, BERN B., Emphysematous gangrene, 760.
- Gasserian ganglion, intact, Excision of, 683; Microscopic examination of, in trigeminal neuralgia, 696.
- Genito-Urinary System, Diseases of the, Review of Fuller on, 106.
- GIBBON, JOHN H., Cholecystitis following typhoid fever, 70; Malposition of kidney, 74.
- GIBSON, CHARLES L., Modified incisions for abdominal sections, 490; Osteoplastic amputations, 637.
- Goitre, 212; exophthalmic, Excision of cervical sympathetic ganglia for, 469.
- Gums, Bilateral growth of, 765.
- Gunshot wounds in the Philippino-American war, 113.
- GWYER, F. W., Artificial bridge of the nose, 44.
- HANDS, the surgeon's, Critical suggestions on cleansing, 349.
- Hare-lip, double, Treatment of intermaxillary bone in, 791.
- HARRIS, MALCOLM L., Hip injuries, 77; Diagnosis of renal calculi, 344; Symptoms of ileus, 497; Operation for establishing collateral circulation in cases of cirrhosis of the liver, 655; Pure carbolic acid in hip-joint abscess, 657; Tendon suture, 661.
- HARTE, RICHARD H., Perforating gastric ulcer simulating appendicitis, 212; Greenstick fracture of the ribs, 66; Cholecystitis following typhoid fever, 71; Contusions of abdomen, 649.
- Head, Gunshot wounds of, with explosive effects, 807.
- Head extension, An improved brace for, 185.
- Hernia, Lumbar, 51; Ventral, following abdominal section, 1; Peritoneal, 622; of the Fallopian tube without hernia of the ovary, 247.
- Herniæ, gangrenous, Primary resection of, 357.
- Hip dislocations, Mechanics of, 75.
- Hip-joint abscess, Pure carbolic acid in, 657; Amputation for sarcoma of femur, 318; Complica-

tions in fractures involving the, 726, 801.

Hopkins's Clinical Treatise on Fractures, Review of, 108.

HORSLEY, J. SHELTON, Excision of the cervical sympathetic ganglia for, 469.

HORCHKISS, LUCIUS W., Diagnosis of appendicitis, 634.

HUNTINGTON, DR., Gunshot fractures, 205; Anastomosis of bowel, 207.

Hydatid of the prostate, 565, 753; of the liver, 755.

Hydrocele, Eversion of the tunica vaginalis as a remedy for, 305.

Hydrogen peroxide, Application of, in surgery, 88.

Hydronephrosis, 72, 73.

Hyoid bone, Median osteotomy of, 356; Traction on, by loop as an aid in narcosis, 673.

Hypospadias, Beck's operation for, 809; Russell's operation for, 218.

**I**LEUS due to vascular obstruction, 443; due to mechanical obstruction to the faecal current, 449; caused by neoplasms, 457; due to gall-stone, 634; Discussion on, before the Chicago Surgical Society, 494.

Iliac artery, common, Ligation of, preliminary to amputation at the hip-joint, 318; external, Extirpation of aneurism of, 473.

International Clinics, Vols. iii and iv, Review of, 666.

International Text-Book of Surgery, Vol. ii, Review of, 102.

Intestine, Gangrene of, due to vascular obstruction, 443.

Intestine holder for suturing, 23.

Iodoform poisoning, 352.

**J**ACOBSON, NATHAN, Contribution to the surgery of malignant disease of the prostate gland and of the tonsils, 269.

Jaw, lower, Resection of, for sarcoma, 330.

JOHNSON, ALEXANDER B., Result of operation for perineal fistula, 47; Treatment of fractured patella, 196; Technique of prostatectomy, 477; Sterilization of knives, 639.

Joint operations, Technique of, 98.

JOPSON, DR., Fracture of the femur during childbirth, 783.

**K**AMMERER, FREDERICK, Surgical invasion of the anterior mediastinum, 56; Subphrenic abscess, 194; Removal of greater part of stomach for cancer, 197; Spinal anaesthesia, 203; Subdural haematoma, 329; Traumatic torticollis, 628; Diagnosis of appendicitis, 632; Osteoplastic amputations, 638.

Keetley's Hand-Book of Orthopaedic Surgery, Review of, 224.

Keloid of median nerve, Traumatic, 13.

Kidney stones, 71; Movable, 72; Hydronephrosis of, 73; Malposition of, 74; multilocular cysts of the, Contribution to the surgery of, 147; Diagnosis of stone in, by the X-ray, 239, 343; Removal of, for tuberculosis, 478, Cases of surgery of, 714, 760; Failure after removal of other kidney, 225, 336, 342; function, The freezing point of the blood as an index to, 96; retention, Conservative operations for, 369; Fracture of, recovery after nephrectomy, 714.

KILIANI, OTTO G. T., Traumatic keloid of the median nerve, with observations upon the absorption of silk sutures, 13; Large traumatic subdural haematoma, with twenty-one days' free interval, 325; Compound depressed fracture of skull with intracranial

hæmatoma, 330; Aneurism of the abdominal aorta, 640.

Knaak über die Subkutanen Verletzungen der Muskeln, Review of, 107.

Knives, Sterilization of, 639.

Knot-tightener, A new, 743.

KNOTT, VAN BUREN, Sarcoma of the uterus, 137.

**L**ANGE, FREDERICK, Cholecystectomy and operation for liver abscess, 189; Multiple papillomata of the bladder; Extirpation by transverse incision through the symphysis pubis, 198; Tuberculosis of kidney, 486; Possibility of the transmission of malignant growths, 492; Posterior incision in certain cases of appendicitis, 764; Renal calculi and cases of nephrectomy, 766.

Laparotomy, Modified incisions for, 489.

Laryngectomy under eucaïne anæsthesia, 32; Unilateral, 635.

Lateral curvature of the spine, A hard rubber spring brace for, 185.

LE CONTE, ROBERT G., Excision of the carpus for tuberculosis, 58; Carcinomatous degeneration of uterine myoma, 60; Pyopneumothorax, 67; O'Hara's method of bowel anastomosis, 207; tubercular peritonitis, 208; Thyroid cyst, 212; Operation in the pre-perforative stage of typhoid fever, 645; shot as a nucleus of vesical calculus, 647.

LEE, EDWARD H., An intestine holder, 23.

Leg, Torsion fractures of, 93; Compound complicated fracture of the, 787.

LEONARD, CHARLES LESTER, Value of the Röntgen method of diagnosis of renal and ureteral calculi, 435.

LILIENTHAL, HOWARD, Cholecystectomy, 188, 193; Treatment of fractured patella, 195; Postoperative anuria, 337; Gunshot wounds of abdomen in negroes, 475; Prostatectomy, 478; Fracture of the patella, 487; Diagnosis of appendicitis, 632; Gallstone ileus, 634.

Lip, lower, Long immunity from recurrence after removal of epithelioma of, 51.

Liver abscess, 189, 757; cirrhosis of, Operative treatment of, 653, 663, 715, 791; Echinococcus of, 755.

Ludwig's angina, 720.

**M**CARTHUR, L. L., Ileus due to vascular obstruction, 443; Operation for establishing collateral circulation in cases of cirrhosis of the liver, 653; Treatment of hip-joint abscesses, 658; Carcinoma of the rectum, 661.

McCOSH, A. J., Result of operation for spinal tumor, 45; Diagnosis of appendicitis, 629.

MACDONALD, WILLIS G., Improved technique in the operative surgery of carcinoma of the stomach, 157.

Malignant growths, Possibility of the transmission of, 492.

MARTIN, FRANK, Report of case of recovery after abdominal section for multiple gunshot wounds of the abdomen, 311.

MAYO, WILLIAM J., Extirpation of the mucous membrane of the gall-bladder, 192.

Mediastinum, anterior, Surgical exposure of, 56.

MELLISH, E. J., Large vesical calculus, 347.

MEYER, WILLY, Cholecystectomy, 193; Carcinoma of temporal region, 194; Wiring of fractured

- patella, 194; Papilloma of the bladder, 201; Postoperative anuria, 336; Treatment of tubercular cystitis, 334; Prostatectomy, 477; Cystoscope in diagnosis of tuberculosis of genito-urinary tract, 487; Rare complications after operations for appendicitis, 605; Unilateral laryngectomy, 635; Osteoplastic amputation of the arm, 636, 709.
- MILLER, M. B., Infection by bacillus *aërogenes capsulatus*, 770.
- Minor Surgery and Bandaging, Review of Wharton on, 813.
- MIXTER, SAMUEL J., Cases of laceration of the spleen and of the kidney followed by recovery after the removal of the injured organ, 713.
- MOORE, JAMES E., Operative treatment of fractures, 206.
- MORF, PAUL F., Hernia of the Fallopian tube without hernia of the ovary, 247.
- MORGAN, WILLIAM E., Traumatic aneurismal varix of the skull following a fracture of the base, 339; Inspiration of fecal vomitus in operations for ileus, 499.
- MURRAY, FRANCIS W., The surgical treatment of amœbic dysentery, 574; Resection of lower jaw for sarcoma, 330; Tubercular cystitis treated by permanent suprapubic drainage, 31.
- Muskeln, Die subkutanen Verletzungen der, by Dr. Knaak, Review of, 107.
- Myositis ossificans traumatic, 359.
- N**ARCOSIS, Traction on hyoid bone as an aid in, 673.
- NEILSON, THOMAS R., Acute cholecystitis complicating typhoid fever, 68.
- Neoplasms as a cause of ileus, 457.
- Nephrectomy. Anuria following, 225, 336, 342; for tuberculosis, 478; for fracture, 714.
- Nephrolithiasis, 71; Diagnosis of, by the X-ray, 239, 343.
- Nerve, keloid of median, 13; Suture, 354.
- Neuralgia, trifacial, Excision of Gasserian ganglion for, 683; Pathology of, 696.
- New York Surgical Society, Transactions of the, 42, 51, 188, 323, 473, 626, 635, 753.
- Nose, Artificial bridge of the, 42; deformity of, Plastic operation for, 764.
- O**BSTETRIC fractures, 775.
- OCHSNER, A. J., Ileus caused by neoplasms, 457, 501.
- OCHSNER, EDWARD H., Treatment of fractures involving the hip-joint, 801.
- Œsophagus, diverticula of, Operation for, 91.
- O'HARA, M., JR., A method of performing anastomosis of hollow viscera by a new instrument, 179, 207; Specimen of suture of bowel, 650.
- OLIVER, JOHN CHADWICK, Cases of properitoneal hernia, 622.
- Ollier, testimonial, Circular, 672.
- Omental fixation to establish collateral circulation in cases of hepatic cirrhosis, 653, 663, 715, 791.
- Omentum, Surgical pathology of the, 664.
- Orthopædic Surgery, Keetley's Hand-Book of, Review of, 224.
- Osteoplastic amputation of the arm, 636, 709.
- OWENS, JOHN E., Complications in fractures involving the hip-joint, 726, 801.
- P**ALATE, Osteoma of, 766.
- Pancreas, Surgery of the, 503.

- Pancreatitis, Surgical treatment of, 216.
- Paralysis, operative, of spinal accessory nerve, 558.
- Patella, Wiring of fractured, 194; Fracture of, 487.
- PAUL, THOMAS M., Fracture of the pelvis, 733.
- Pelvis, Fractures of the, 733.
- Perineal fistula, Result of operation for, 47.
- Peritonitis, Tubercular, 208.
- PETERS, LINDSAY, Resection of the pendulous, fat abdominal wall in cases of extreme obesity, 299.
- Pharyngeal occlusion, Plastic operation for, 56.
- Pharynx, Cicatricial stricture of, cured by plastic operation, 152.
- Philadelphia Academy of Surgery, Transactions of the, 58, 62, 205, 208, 643, 768, 785.
- Philippino-American war, Gunshot wounds in the, 113.
- Phonendoscope, Review of Bianchi on, 366.
- PILCHER, LEWIS S., Results obtainable in the treatment of dense, tight, deep-lying strictures of the urethra, 79.
- Plaster of Paris as an immediate dressing after fracture of leg, 798.
- PORTER, W. G., Twig of tree as nucleus of vesical calculus, 648; Plaster of Paris as an immediate dressing after fracture of the leg, 798.
- Progressive Medicine, Review of, Vol. iii, 364; Review of, Vol. iv, 814.
- Prostate gland, Malignant disease of the, 269; Hydatid of the, 565, 753.
- Prostatectomy by Alexander's method, 476.
- Prostatic hypertrophy, Results of operative treatment of, 810.
- Psoas muscle and the appendix vermiformis, 387.
- Pyopneumothorax with greenstick fracture of the ribs, 62.
- R**ADIUS, Fracture of the lower extremity of the, with vicious union, 335; Fissure of the head of, 466.
- Rectal incision of appendical abscesses, 809.
- Rectum, Carcinoma of, 661; cancer of, Results of extirpation of, 95; Imperforate, 788.
- Renal calculi, Cases, 766; cyst, multilocular, Contribution to the surgery of, 147; retention, Conservative operations for, 369; and ureteral calculi, Value of Röntgen method of diagnosis of, 435.
- Ribs, Greenstick fracture of, with pyopneumothorax, 62.
- RIDLON, JOHN, Fractures involving the hip-joint, 805.
- ROBERTS, JOHN B., Infection by bacillus *aërogenes capsulatus* in an open fracture of the radius and ulna, 768, 771; Operative treatment of cirrhosis of the liver, 792.
- ROBINSON, BYRON, The appendix in relation to the psoas muscle, 387.
- ROBINSON, E. F., Gunshot wounds in the Philippino-American war, 113.
- RODMAN, DR., Fracture of femur during childbirth, 784.
- ROGERS, JOHN, Prostatectomy by Alexander's method, 476.
- Röntgen rays, Value of, in diagnosis of renal and ureteral calculi, 435.
- ROSS, GEORGE G., Leather shoe-string as nucleus of vesical calculus, 648; Angina Ludovici, 720.
- RUDIS-JICINSKY, J., Value of the X-ray in surgery, 749.

- SCHWAB, SIDNEY I.**, Pathology of trigeminal neuralgia, 696.
- Scudder** on The Treatment of Fractures, Review of, 812.
- SENN, E. J.**, Surgery of the tendons, 659.
- Shoulder**, Exostosis of, simulating dislocation, 53.
- Silk sutures**, Observations on the absorption of, 13.
- Skull**, Aneurismal varix of the, 339; Compound depressed fracture of the, 491; Subdural hæmatoma after injury of, 325; Extradural hæmatoma, 330; Results of operations for severe fractures of the, 323, 330.
- Southern Surgical and Gynæcological Association**, Transactions of, Vol. xii, Review of, 366.
- SPELLISSY, JOSEPH M.**, Braces for head extension and for lateral curvature of the spine, 185.
- Spina bifida**, 50.
- Spinal accessory nerve**, Operative paralysis of, 558; Anæsthesia for operation for strangulation of bowel, 203; tumor, Result of operation for, 45.
- Spine**, lateral curvature of, A hard rubber spring brace for, 185.
- Spleen**, Surgery of the, 513; Rupture of, 713.
- STEELE, D. A. K.**, Ileus due to mechanical obstruction to the fæcal current, 449, 500.
- STEINBACH, DR.**, Fracture of the femur in infants, 784.
- STEWART, FRANCIS T.**, Pyopneumothorax with greenstick fracture of the ribs, 62; Left-sided appendiceal abscess, 772, 773.
- STIMSON, LEWIS A.**, Artificial bridge of the nose, 44; Traumatic cubitus varus, 48; Modified incisions for laparotomy, 489; Treatise on Fractures and Dislocations, Third Edition, Review of, 107.
- Stomach**, Perforating ulcer of, 212; Removal of greater portion for cancer, 197; carcinoma of, Improved technique in the operative surgery of, 157; Wound of the, 651.
- Stricture of the pharynx**, cicatricial, Plastic operation for, 152; of the urethra, dense, tight, deep-lying, Results obtainable in the treatment of, 79.
- SUMMERS, JOHN E., JR.**, Double ureter, 39.
- TAIT, DUDLEY**, Eversion of the tunica vaginalis as a remedy for hydrocele, 305.
- TAYLOR, WILLIAM J.**, Excision of the wrist, 59; Perforation of intestine from kick of gun, 648.
- Temple**, Carcinoma of, 194.
- Tendon**, Implantation, periosteal, 100; Surgery, 582, 659.
- Thyroid cyst**, 212.
- Toes**, Dislocations of the, 643.
- Tongue**, Congenital angioma of, 659.
- Tonsils**, Malignant disease of the, 280.
- Torsion fractures of the leg**, 93.
- Torticollis**, 793; spasmodic, Operative treatment of, 509; Traumatic, 627, 756.
- Trephining**, Results of, for fractures of the skull, 323.
- Trifacial neuralgia**, Excision of Gasserian ganglion for, 683; Pathology of, 696.
- Tuberculosis of bladder treated by permanent suprapubic drainage**, 331; of the carpus, 58; of the kidney, Nephrectomy for, 478; of peritoneum, 208.
- TURCK, FENTON B.**, Spasm of intestines after their exposure by operations, 500.
- Typhoid fever complicated by acute**

cholecystitis, 68; Operation during the preperforative stage of, 645; Surgical intervention for intestinal perforation in, 544.

**U**RETER, Double, 39.

Ureteral calculi, Diagnosis of, by Röntgen rays, 435.

Urethra, Results obtainable in the treatment of dense, tight, deep-lying strictures of the, 79.

Uterine myoma, Carcinomatous degeneration of, 60.

Uterus, Sarcoma of, 137.

**V**ARICOSE veins, Trendelenburg's operation for, Results of, 806.

Vascular obstruction as a cause of ileus, 443..

Vesical calculus, Large, 347; with shot as nucleus, 647; with twig of tree as nucleus, 648; with leather shoe-string as nucleus, 648.

**W**ALKER, JOHN B., Tumor of gum, 766; Diagnosis of appendicitis, 633.

Warren and Gould, International Text-Book of Surgery, Vol. ii, Review of, 102.

WARREN, J. COLLINS, The surgery of the spleen, 513.

WHARTON, HENRY R., Cases of compound or complicated fractures, 171, 205; Intestinal obstruction simulating appendicitis, 789; Treatment of intermaxillary bone in double hare-lip, 791; Operative treatment of cirrhosis

of the liver, 791; Wry-neck, 798; Traumatic spreading gangrene, 770; Fracture of the femur during childbirth, 783; Cholecystostomy, 785; Complicated compound fracture of the leg, 787; Imperforate rectum, 788; Minor Surgery and Bandaging, Review of, 813.

WHITMAN, ROYAL, Manual traction to overcome muscular contractions, 55; Results of treatment after fracture of patella, 196; Operation for deformity following fracture at the wrist, 202; Traumatic torticollis, 627, 756.

WILLARD, DE FOREST, Wound of the diaphragm and stomach, 651; Obstetric fractures of the femur, 784; Wry-neck, 793; Plaster of Paris in fractures in children, 800.

WILSON, H. AUGUSTUS, Fracture of the femur in an infant, 775; Obstetric fractures, 784.

WILSON, W. REYNOLDS, Injuries to femur during childbirth, 782.

WOOLSEY, GEORGE, Treatment of fractured patella, 196; Gunshot wound of abdomen, 476; Sterilization of knives, 640.

Wrist, Deformity following fracture at the, 202; Excision of the, 58.

Wry-neck, 793.

**X**-RAY in surgery, Value of, 749.

**Z**INC chloride in inoperable tumors, 89.

